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OPA Reduces Prices of Many Kraft Papers

Maximum Price Regulation No. 182 Becoming Effective July 28 Rolls Back Manufacturers' Prices About 25 Cents Per Cwt. — Zone, Quantity, Sheet and Other Basic Differentials Are Explained.

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., July 23, 1942—Major reductions from current manufacturers' and distributors' prices for kraft wrapping papers and certain kraft bag papers are affected by Maximum Price Regulation No. 182 issued today by Price Administrator Leon Henderson.

Today's action rolls back manufacturers' prices on these commodities approximately 25 cents per hundredweight to the levels existing October 1 to 15, 1941. Distributors' mark-ups which existed prior to the inflationary period in the paper market during the latter half of 1941 are restored by the order. Zone, quantity, sheet, basis weight, and other differentials based upon those established in the industry are also set forth.

Issues Industrial Paper Amendment

Accompanying today's action is Amendment No. 5 to Maximum Price Regulation No. 129 (Industrial and Converted Paper Products) which revokes all the provisions in that regulation fixing top prices for kraft wrapping papers and kraft bag papers sold by producers. Similarly, Maximum Price Regulation No. 182 supplants the use of the General Maximum Price Regulation in determining the maximum price distributors may charge for these commodities. Manufacturers and distributors sales have been controlled by these earlier regulations since May 11, 1942.

In its study of current conditions, OPA found that many of the factors which contributed to the inflationary period of 1920 were present during 1941. Mill prices for the key-commodity ranged, during this period, from $4.25 to $8.00 per cwt. The study also showed that most mills had realized greater profits last year than in many previous years and that, spurred by speculative and "scare" buying, heavy profit taking was common in the distributor field. Manufacturers generally will be able to absorb the reduction in prices, the studies revealed.

Regulation Effective in July and August

Maximum Price Regulation No. 182 will become effective July 28, 1942 for manufacturers and on August 25, 1942 for distributors. The later effective date for distributors will make possible the release of existing stocks which distributors may have purchased at prices higher than those fixed by the regulation.

A provision of the regulation allows manufacturers and distributors to complete obligations contracted under previous regulations at prices which may be higher than those fixed by this regulation providing these contracts were entered into before July 28, 1942. Deliveries under these contracts, however, must be made before August 25, 1942, in sales by manufacturers, and September 15, 1942, in sales by distributors.

MAXIMUM PRICES IN SALES BY MANUFACTURERS

Grades	Maximum base prices per cwt.
Standard Kraft Wrapping Paper (30 pound basis weight and heavier)	$4.50
No. 1 Kraft Wrapping Paper (30 pound basis weight and heavier)	4.75
Superstandard Kraft Wrapping Paper (30 pound basis weight and heavier)	5.00
Imitation Kraft Wrapper Paper (40 pound basis weight and heavier)	4.25
Standard Unbleached Kraft Butchers Wrapping Paper (40 pound basis weight and heavier)	4.75
No. 1 Unbleached Kraft Butchers Wrapping Paper (40 pound basis and heavier)	5.00
Machine Glazed Kraft Wrapping Paper (25 pound basis weight and heavier)	5.25
Standard Kraft Bag Paper (30 pound basis weight and heavier)	4.125
Variety Kraft Bag Paper (30 pound basis weight and heavier)	4.375
Machine Glazed Kraft Bag Paper (25 pound basis weight and heavier)	5.00

The prices above are for rolls in carload lots, Zone A, f.o.b. mill, lowest available carload rate of freight allowed to destination point. To these prices may be added the applicable differentials listed in the regulation for zones, quantity, sheets, lower-basis-weights than those specifically listed, rolls less than 9 inches in diameter, rolls less than 6 inches in width, special packing of sheets and rolls. Any differentials for colors, more costly finishes, special machine markings other than machine glazed striping or felt striping and test specifications in excess of those set forth in the regulations must not be more than the

(Continued on page 26)

Plan to Avoid Destructive Pulpwood Cutting

Conference Held Last Week Is Expected To Result In Definite Conservation Policies — Voluntary Action Is Sought To Effect Selective Logging Practice — Kimberly To Head WPB Branch.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., July 27, 1942—Definite policies respecting the cutting of pulpwood so as to prevent destructive practices are expected to grow out of a conference at Wausau, Wis., Friday and Saturday of last week, held under the auspices of the Wisconsin Conservation Commission. Practically all of the wood-using pulp and paper mills were represented among the 64 persons attending.

Proposals submitted for adoption included buyer's specifications that spruce, balsam, pine and tamarack pulpwood be cut only where diameters run from four to five inches inside the bark, and where a tree has two or more sticks per tree. Pulpwood stands of white spruce, Norway pine and white pine would be cut only where trees contain four or more sticks. In the case of black spruce, jack pine and tamarack, only trees containing three or more sticks or trees eight inches or over in diameter at breast height would be taken. There would be no restrictions on the cutting of popple. Definite specifications also were set up for the lumbering industry.

Paper Men at Conference

R. B. Goodman of Marinette, Wis., lumberman and a director of the Northern Paper Mills, Green Bay, Wis., was in charge of the conference, and William J. P. Aberg of Madison, Wis., chairman of the Wisconsin Conservation Commission, president.

George W. Mead, president of the Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., represented the sulphite paper mills in the discussions, and John E. Alexander of the Nekoosa-Edwards Paper Company, Port Edwards, Wis., the kraft mills. Both companies maintain vast private forests to assure a future pulpwood supply and have been advocates of selective cutting such as the conference proposed. E. B. Hurst and F. G. Kilp, chief foresters, respectively, of these companies, served on the committee which drafted the proposals.

Voluntary Action Is Sought

Voluntary action is sought through adoption of purchase specifications which would prevent pulpwood and timber jobbers from delivering any logs under the cutting diameters proposed. It was the committee's plan to convert these stipulations to a legislative act as a means of making the voluntary policies permanent, but this cannot be done until the next meeting of the Wisconsin Legislature in January. Jay H. Price of Milwaukee, Wis., regional forester of the United States Forest Service, told the conference that if the state did not take regulatory action, the federal government would. He expressed the belief that voluntary regulations would not be enough. There must be either a state or federal control program, he said, or a government subsidy would be necessary during regrowth of timber. He added that there are about 2,000,000 acres of nearly virgin timber in Wisconsin on which selective logging is advisable.

The proposed regulations were presented by F. G. Wilson of Madison, Wis., superintendent of cooperative forestry for the conservation department. The objective, he said, is to keep forest lands continuously productive at highest practicable rates with a view toward increased values accruing to the owners, together with increasing indirect public benefit.

Benefits of controlled cutting on small operations were presented by F. B. Trenk, extension forester of the college of agriculture at the University of Wisconsin.

Similar Set-up for Michigan

Plans for a similar setup in Michigan were announced by State Senator George P. McCallum of Ann Arbor, to be accomplished through legislative action. A Minnesota spokesman pointed out that control programs for Wisconsin, Michigan and his state were greatly similar, and suggested that they be worked out cooperatively.

J. R. Kimberly to Head WPB Branch

John R. Kimberly, of Neenah, Wis., is slated to head the bureau of industry branches of the War Production Board in Washington, D. C., succeeding Philip D. Reed, whom he served as assistant, according to WPB sources. Mr. Kimberly left his position as assistant general superintendent of Kimberly-Clark Corporation last fall to take a $1 a year job in Washington. He is a director of the corporation, and also vice-president of the International Cellucotton Products Corporation.

Marathon Employees Hold Picnic

Employees and their families to the number of approximately 2,500 enjoyed the annual picnic of the Marathon Paper Mills Company, Rothschild, Wis., Sunday, July 19. It was held at Rothschild Park and was the seventh annual gathering of this kind. The afternoon and evening were spent with games and other amusements, and the crowning of king and queen for the day. Austin C. Trull of Waupaca, Wis., a professional clown, performed for the children. Clarence Hussong was general chairman.

Thilmany Offers Improvement Plan

Cooperation of the Thilmany Pulp and Paper Company has been offered the city in a plan to improve the north bank of the government canal of the Fox River at Kaukauna, Wis. The area is to be made into a park for its entire length, according to arrangement made by the city council. The offer of help was made by Charles R. Seaborne, vice-president in charge of manufacture for Thilmany company. He announced that at some future date the company would lease part of the park area for a civic center and hall to be built by the Kaukauna labor unions.

Midwest Expects Slow Market Until Fall

Demand For All Paper Items Are Currently Reported As Very Slow Excepting A Few Specialties—Some Improvement In Waste Paper Market — Executives In New Positions — Other News.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., July 28, 1942—Local representatives of the paper industry are becoming more and more convinced that the demand situation in this territory will not be materially benefited until Fall. By that time, according to local reports, the huge inventories accumulated during the "scarcity wave" will have been at least partially diminished and buyers more interested in further orders. Right now things are very slow in all lines with the possible exception of two or three specialties. There is some improvement in the waste paper market as the "heat" on collection of waste papers has diminished. Little improvement is indicated in the advertising papers situation where all grades are meeting not only with large inventories but a general decline in business. Kraft papers, up until recently, far ahead of the market, are likewise experiencing difficulty in moving surpluses. Sulphites were in a similar position according to Chicago offices. The production schedule of the mills represented in this area was also reported as slowing down with promises of further reductions until early Fall.

L. E. Leverone in New Position

Louis E. Leverone, long associated with the Stein-Hall Manufacturing Company, makers of starches and other products used in the paper industry, has recently become actively affiliated with the Automatic Canteen Company as a director. Mr. Leverone recently resigned as vice-president and general managter of Stein-Hall. He has been indirectly connected with Automatic Canteen since its formation by Nathaniel Leverone, president of the company, who is likewise Salvage Director for the State of Illinois under the Government's conservation program.

Spachner In New Connection

J. V. Spachner, vice-president of the Container Corporation of America in charge of its paper stock division, is to become head of the Western Container Division with offices at 111 W. Washington Street, in Chicago. He will, according to reports, retire from the presidency of the Pioneer Paper Stock Company and as head of its purchasing, traffic and transportation divisions. F. J. Sauer will continue to assist Mr. Spachner in the purchase and sale of pulp.

H. H. Heimann Addresses Audit Group

Henry H. Heimann, executive head of the National Association of Credit Men, will address members of the Chicago Association of Credit Men at a special meeting to be held from 5 to 6 p.m. on Monday of next week. The meeting will be held in the Association offices in the Merchandise Mart. The association executive is expected to discuss wartime credit problems as they affect credit men. Quite a few representatives of the paper industry are expected to be present.

Effects of Wage Ceilings in Bush

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., July 27, 1942—The Canadian lumber and the pulp and paper industries, are beginning to experience one of the inevitable results of wage ceilings. It is easy enough to freeze wages in all industries and prevent increases being paid, but the trouble comes when men decide to shift from the lower paid work to more remunerative employment. While a "bush whacker" cannot easily become a skilled worker in the metal trades, when the latter is in great demand and industry in the larger centers of population is active, there are now more opportunities for unskilled workers and at higher pay than would ordinarily prevail. Regulations prevent men from leaving essential war work and from jumping from one job to another, but it would be difficult to frame regulations that would prevent men ordinarily dependent upon seasonal employment in the woods from accepting steady work in a more populous community, even if he could not command better pay. The labor situation is at present the most serious factor bearing on production in the lumber and allied industries.

Present wage levels in these industries are not competitive or comparable with wages paid in war industries and government projects. Many operators claim that present prices would not enable them to pay competitive wage rates, even if they were granted permission by the Labor Board, or assuming that they could obtain the men.

With the lessening demand for newsprint, producers are confident they can meet requirements, in spite of the many problems cropping up. The margin left after the increased costs have been met, with no increase in the price of the product, is the question of greatest concern. At present mill operations are well below capacity, so that fewer materials and less labor are required to provide sufficient paper for current requirements. From that standpoint the situation for the mills is easier than it has been for some time past.

C.P.P.A. Opens Vancouver Branch

MONTREAL, Que., July 27, 1942—To provide a closer integration of "East and West" in the pulp and paper industry, Lawrence Killam, president and general manager of the British Columbia Pulp and Paper Company, has been elected a member of the Executive Committee of the Canadian Pulp and Paper Association. At the same time, a temporary branch office of the Association, to be known as the Western Branch of it, has been established in Vancouver, in charge of H. J. McKenzie, formerly manager of the Export Sales Company Limited, Vancouver, who has been appointed an Assistant Secretary of the Canadian Pulp and Paper Association. These steps follow on a visit to British Columbia of R. L. Weldon, president of the Association, and A. E. Cadman, secretary-manager.

TAPPI Fall Meeting Program at Boston To Stress Essentials

In response to an inquiry, Ralph A. Hayward, President of the Technical Association has written as follows:

"There certainly is every reason for having a meeting of the Technical Association in September. With the rapid changes that are taking place in the industry, the need for conservation of critical materials, and the need of developing paper products to meet the needs of the Country, it is very important to bring the technical men and executives together to consider these important matters. Such a meeting should be one of the most valuable contributions that the Association can make to the war effort."

There are many organizations that, in the past, have put on affairs that were primarily devoted to pleasant social features. In war time it is probably inadvisable to hold meetings for such a limited objective, even with the window dressing of a brief serious conference. The fall meeting of TAPPI is being planned to serve a vital purpose and although there will be recreational features organized to assist members to become better acquainted the main objective will be to consider the industry's technical problems and ways to help win the War.

The Program Committee for the Fall Meeting of the Technical Association of the Pulp and Paper Industry to be held at the Hotel Statler in Boston September 29 through October 1, is planning a conference of vital concern to the industry and the defense program.

Tuesday, September 29, will be Federal Government Day. In the morning a general session will be held at which the various problems of both Government and the industry will be discussed.

In the afternoon there will be a panel discussion to bring everyone up to date on developments in priorities, allocations and substitution products. There will be ample time for questions and members are urged to put their questions in writing and submit them in advance.

Concurrent with the panel discussion there will be a session to deal with engineering subjects.

On Wednesday morning, September 30, a Containers, Wraps and Protective Coatings Symposium will be held. Some of the subjects to be discussed will be dehydrated foods packing, Quartermaster Corps Requirements, Protective Coatings, Converters' Problems, etc.

Wednesday afternoon will be Contact Day. It is realized by the General Committee that many people come to these meetings with a definite list of many people whom they wish to see. It is quite likely that the interest in the morning session will require a continuation into the afternoon.

Wednesday afternoon also may be devoted to golf or mill visits. The facilities of the Woodland Country Club will be available for golfers and a list of mills open to visitors will be published later.

On Thursday morning, October 1, there will be a symposium on Tub Sizing, and concurrently a meeting sponsored by the Water Committee and one on Pulping and Pulp Purification.

On Thursday afternoon the final Technical Session will be devoted to problems confronting Technical and Research Departments. This session will include personnel problems and also specification problems and changes.

The Meeting will be brought to a close on Thursday night with a Banquet and Dance. A prominent columnist will be the speaker at the banquet.

Details of the program will be published as soon as available.

It may be interesting to know some of the facts about the establishment of the first paper mills in the greater Boston area.

In the early days papermaking was regarded somewhat as a public utility, and it came under the watchful supervision of the Public Commission. Permission to engage in papermaking was a prerogative of the government, and a monopoly usually for a period of ten years was granted. The first charter of this kind was granted in 1728 by the "Great and General Court of the Province of the Massachusetts Bay" to the following substantial citizens of Boston: Daniel Henchman, Gillam Phillips, Henry Dering, Benjamin Faneuil and Thomas Hancock. The last two names are familiary to all students of the American Revolution. These men took over a grist mill on the Milton side of the Neponset River, about eight miles from Boston. It was not until 1730, and after much difficulty, that they succeeded in making small quantities of loft dried papers. The mill was not particularly successful until it was taken over by Jerimiah Smith in 1741. Another mill was built by Boies and Clark nearby in 1764, and it is interesting to note that in the late 18th century, Daniel Vose and Mark Hollingsworth became identified with the second mill, and introduced to this locality the names of well known paper manufacturers of today.

Not far from the site of these old mills stands the Tileston and Hollingsworth Company paper mill of today. The mills of Hollingsworth and Vose are only a few miles away in East Walpole. Here also is the paper mill of Bird and Son. In Newton Lower Falls and Waltham, both very near to Boston are the C. F. Crehore and Sons, and the Stony Brook Paper Company mills that have been in continuous operation for over a century. About 15 miles west of Boston, in Natick, is the Natick Box Board Co., and a few miles away in Framingham is the Dennison Mfg. Company, one of the largest converters of paper in the United States. Within an hour's train ride from Boston are the well known paper mill towns of Fitchburg, Leominster, Lawrence, Haverhill, East Pepperell, and West Groton.

Across the Charles River from Boston at the Massachusetts Institute of Technology is located the Dard Hunter Paper Museum, which is known throughout the world as having one of the finest collections of ancient and oriental papers in existence. It also contains old paper making equipment.

All who will attend the fall meeting of the Technical Association of the Pulp and Paper Industry at the Statler Hotel, Boston, Mass. (Sept. 29-30 and October 1st) will be well repaid for doing so.

Obituary

Arthur William Driscoll

LIVERMORE FALLS, Me., July 27, 1942—The sudden death of Arthur Williams Driscoll occurred Saturday, July 11, at his summer cottage on Pocassett Lake, Wayne. He was born at East Pepperell, Mass., July 11, 1877 and Saturday marked his 65th birthday. Dr. Driscoll was the son of the late John and Martha Williams Driscoll. He was production superintendent at the Otis Mill of the International Paper Co. and had been employed by this company for the past 46 years.

Mr. Driscoll was a Past Master of Oriental Star Lodge, No. 21, A. F. and A. M., a Past High Priest of Androscoggin Royal Arch Chapter, R. A. M., a 32nd Degree Mason and Past Patron of Washburn Chapter, O. E. S., and attended the First Baptist Church at Livermore Falls.

He is survived by his widow, Maude Chenery Driscoll, a daughter, Mrs. Vera Varney, of Augusta, a son, Merwyn, Palmer Falls, N. Y.; and a sister, Mrs. John Covil of Chisholm.

Funeral services were held Tuesday afternoon at 2:00 o'clock at the home with Rev. F. Stewart Kinley of the First Baptist Church officiating. The bearers were Allen Lewis, A. L. Johnson, Everett Strout and Herbert Corkum. Interment was at Pleasant Hill Cemetery with Committal Services conducted by Oriental Star Lodge, No. 21, A. F. & A. M.

August Frederick Richter

August F. Richter, chairman of the Stebbins Engineering and Manufacturing Company, Watertown, N. Y., died on Thursday, July 16. Mr. Richter was born in Milwaukee, Wis., in 1873. From 1890-93 he was superintendent of the Remington Paper Company. During this period he helped to build the DeGrasse Paper Mill at Pyrites, N. Y., in which from 1896-98 he was superintendent. From 1894-95 he was in charge of the sulphite mill at Mechanicville, N. Y. From 1899-1901 he was a partner in the firm of Stebbins & Richter. From 1901-02 he was in charge of construction of the Remington & Martin Mill at Norfolk, N. Y. In 1903 he became President of the Stebbins Engineering and Manufacturing Company, later becoming president, treasurer and chairman. From 1915-17 he was a partner in the Hall and Richter Paper Company.

Gus Richter was universally known and highly esteemed throughout the sulphite and the paper industry throughout the world, being identified as the leading expert on digester linings. He was for many years active in the Technical Association of the Pulp and Paper Industry. Burial took place from his home in Watertown on Sunday, July 19.

Clarence A. Wiswall

[FROM OUR REGULAR CORRESPONDENT]

Clarence A. Wiswall, 87, a pioneer in the New England paper mill industry and a retired paper box manufacturer, died July 21 at his home, 293 Summer avenue, Reading, Mass., after a short illness. Mr. Wiswall was the founder of the Wakefield Paper Box Company, of which he was the head until he retired 11 years ago.

Born in Newton, he entered the business with his father after completing his schooling at the age of 18. From 1880 until 1892 he conducteed a mill in Newton and later operated mills in Waltham, Wakefield and Bradford, Vt. In later years until he retired in 1930, he was associated with his son, Augustus C. Wiswall in the operation of the Wakefield Paper Box Company.

A few years ago he published a book "100 Years of Paper Making," a history of the industry. Of Revolutionary War ancestry, he was interested in early American history and owned rare volumes of the history of George Washington.

He was a member of the Sons of American Revolution, the Massachusetts Society of the Order of Founders and Patriots of America, the Society of Colonial Wars, the Bunker Hill Association, and was a veteran member of Zetland lodge of Masons. He was a Mason for 50 years.

He leaves another son, Dr. Thomas Wiswall of Falmouth; two daughters, Mrs. Clinton Crafts and Mrs. Wilfred Pratt, both of Reading; seven grandchildren and four great-grandchildren.

C. V. Cassidy

C. V. (Clint) Cassidy died last month. He had been confined to the house for several years. Mr. Cassidy was associated with the International Paper Company for some thirty years. For many years he was manager of the company's Hudson River Mill at Corinth, N. Y. Burial was at Glens Falls, N. Y.

Acme Steel Awarded Treasury Flag

Colorful ceremonies marked the presentation of the Minute Man Flag recently awarded by the U. S. Treasury Department to the Archer Plant of Acme Steel Company, Chicago. With more than 96% of Acme employees buying War Bonds on the Payroll Allotment Plan, the coveted emblem was easily won.

Chester M. MacChesney, first vice-president, accepted the citation for the company from J. C. Gallaher, First Deputy Administrator of the Illinois Savings Bond Staff of the Treasury Department.

The flag was presented to the three employees whose percentages of payroll deduction for War Bonds are the largest. Catherin Deady, a telephone operator, represented the office force as 26% of her salary is used for the purchase of Bonds. Edward Lyskawa, an inspector on the factory salaried payroll, buys Bonds on the basis of 48% of his weekly pay, while Wm. Holdsworth, an apprentice machinist, uses 23% of his earnings to help defeat the Axis.

J. E. Ott, Archer plant manager, presided at the noon hour event. Bobby Arnst of musical comedy fame, sang. Besides Mr. Gallaher, other representatives present from the Treasury Department included Clifford Merry and A. J. Parkins. Petty Officer Pitts of the U. S. Navy spoke as did Leo Crown, a French soldier who spent six months in a German prison camp before he escaped to the United States. Mr. Crown described the inadequacy of French preparedness and the horrors faced by wage earners in the conquered countries of Europe.

At Acme's Archer plant is produced a number of ordnance items as well as strap-applying tools and other necessary shipping reinforcement products required in the war effort.

Instrumentation Studies. XL*

Measurement of the Tensile Strength of Paper

Part I: General Considerations of the Factors Affecting this Measurement

By the Staff of the Institute of Paper Chemistry

Abstract

Tensile testers are classified according to the method of loading the specimen. Following this classification, pendulum, inclined-plane, hydraulic, and spring types of instruments are described.

The dead-weight method of calibrating the several types of instruments is discussed. It is shown that pendulum-type testers should not be calibrated by allowing the test weight to ride down on the lower clamp because the follow-through of the loaded pendulum causes a serious error, particularly at small loads and high clamp speeds. Calculation of the follow-through of the pendulum of a typical instrument in the actual testing of a specimen shows the follow-through to be much smaller than that of the pendulum loaded with the dead weight and to be negligible except when weak papers are tested at high speeds.

The effects of rate of loading, specimen length, and specimen width are reviewed and additional data are presented. Tensile strength increases as the rate of loading increases and decreases as the specimen length increases. It appears that the relative tensile strength (tensile strength per unit width of specimen) should be independent of specimen width for wide specimens but that it should decrease rapidly for widths less than approximately half an inch.

For many years tensile strength has been considered one of the important physical properties of paper, and for an even longer time tensile tests have been used by engineers to characterize metals. The concept of tensile strength and the technique of its measurement were taken over, with suitable and necessary modifications, from engineering practice by the paper industry.

According to engineering usage the tensile strength, or ultimate strength, of a material is obtained by dividing the tensile force required to rupture the specimen by the initial cross-sectional area of the specimen; thus a quantity is obtained which permits the calculation of the maximum load that can be borne by a machine part or a structural member of any shape or size. In the paper industry, tensile strength is the tensile force required to rupture a specimen of specified width and length; it is not reduced to the force per unit of cross-sectional area. This is a logical variation from the engineering definition, since the tensile strength of paper is not used to predict the strength of fabricated structures but is a criterion of sheet quality.

This part (Part I) of the series deals with the various factors entering into the measurement of the tensile strength of paper and includes a general discussion of the technique for measuring this property. The succeeding parts of the report present the results of critical examinations of particular instruments currently used in the paper industry for measuring tensile strength.

The scope of this report might logically have included a discussion of the measurement of stretch as well as that of tensile strength, inasmuch as both measurements are commonly made on the same instrument. However, the investigation of several factors affecting the measurement of stretch is incomplete and, since the measurement of tensile strength is of greater interest to the industry than that of stretch, it was decided to present the report on tensile strength immediately and to write a later report on the measurement of stretch.

A complete bibliography on the tensile strength of paper is not included in this report because of the comprehensive coverage of the literature which is available elsewhere *(1)*. Reference is made only to the literature which is particularly pertinent to the subject being discussed.

* This report is one of a series issued as a part of the Instrumentation Program of the American Paper and Pulp Association.

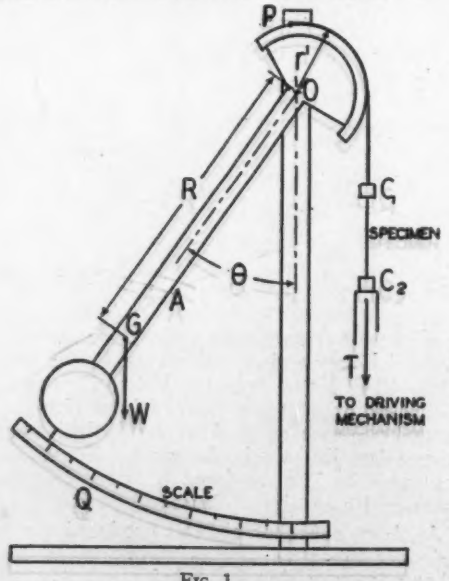

FIG. 1
The Pendulum-Type Tensile Tester

Tensile Strength Testers

Tensile testers may be conveniently divided into types or classes according to the method of applying the load to the specimens. According to this method of classification the following types of tensile testers are among those used in testing paper: pendulum, inclined plane, hydraulic, and spring.

Pendulum Type

The pendulum type of instrument is shown schematically in Fig. 1. A weighted arm *A* is pivoted at

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the axis O and is free to rotate in a vertical plane. A clamp C_1 grips one end of the specimen, usually cut in a long narrow strip with parallel edges, and is fastened to one end of a chain or other correspondingly flexible member which passes part way around the arc or quadrant of radius r' and center of curvature O to the point P, where it is anchored. A second clamp C_2 (often called the stressing clamp) grips the lower end of the specimen and is connected to a screw, piston, or other means by which it may be drawn downward. When the specimen is under no tension, the weighted arm or pendulum hangs vertically with its center of gravity G in the vertical plane through the axis O. As the clamp C_2 is drawn downward, clamp C_1 follows to an extent determined by the elongation of the specimen. This linear displacement of C_1 is transmitted through the chain to the point P and the pendulum undergoes an angular displacement. A mechanism is provided to hold the pendulum in its position of maximum displacement after the specimen breaks. This mechanism usually consists of a group of pawls which are fastened to the pendulum so as to engage teeth cut into a quadrant Q concentric with the axis of the pendulum and fastened to the base or supporting column of the instrument.

A test is carried out in the following general fashion: the specimen is cut into a strip of desired width with the long dimension either parallel or perpendicular to the machine direction of the paper; the long edges are parallel and cleanly cut. The specimen is enough longer than the test length to permit easy handling. The pendulum is brought to its vertical or neutral position and the lower clamp is raised until the separation of the tips of the two clamps equals the desired test length for the specimen. One end of the specimen is held symmetrically between the jaws of the upper clamp and, while the specimen hangs vertically and symmetrically between the jaws of the lower clamp, the upper clamp is tightened. The lower end of the specimen, which projects below the jaws of the lower clamp, is drawn down just enough to straighten the specimen, and the lower clamp is tightened. The driving mechanism is actuated, and it draws the lower clamp downward. The load on the specimen increases as the pendulum swings out from its vertical position and finally it becomes great enough to break the specimen. The pendulum is held in this position by the mechanism referred to above. The scale reading is the load at which the specimen failed.

The clamps must be parallel and must hold the axis of the specimen in a line parallel to the direction of motion of the lower clamp. The specimen must be gripped so that it is uniformly stressed across its width.

The tension T in the specimen, acting through the chain, exerts a clockwise torque on the pendulum. When the upper clamp moves with constant speed or is at rest, this torque is equal and opposite to the counter-clockwise torque which is due to the force of gravity acting on the pendulum at the center of gravity G. This relationship is expressed mathematically in Equation 1:

$$WR \sin \theta = T(r' + d), \qquad (1)$$

where W is the weight of the pendulum, R is the distance between O and G, d is half the thickness of the chain, and θ is the angle which the pendulum makes with the vertical. Hence, the tension in the specimen—i.e., the load borne by the specimen—is given at any time by Equation 2:

$$T = [(WR) / (r' + d)] \sin \theta \qquad (2)$$

Since W, R, r', and d are constant for a particular instrument, the load applied to the specimen depends upon the angular position of the pendulum. Hence, an indicating mechanism is connected to the pendulum (in Fig. 1 it is merely a pointer) and the indicator moves over a scale calibrated to read the load directly in the desired units. This scale is not uniformly divided; the spacing of the divisions is least at the lower end of the scale and continuously increases along the scale.

The range of tensile strengths which can be measured on an instrument may be changed by changing the weight of the pendulum. In case auxiliary weights are supplied to provide for more than one range, the scale is appropriately calibrated for each range.

If the lower clamp is not drawn down with constant speed, the true instantaneous tension in the specimen will be determined not only by the angular position but also by the angular acceleration of the pendulum. Angular acceleration is the rate of change of angular velocity and, as used here, may refer either to an increase or a decrease in velocity. While the clamp is speeding up, the tension is greater, and while the clamp is slowing down, the tension is less than that indicated by the position of the pendulum. On the other hand, if the lower clamp actually moves with constant speed, any change in the rate of elongation of the specimen causes an acceleration of the pendulum; in this case the angular speed of the pendulum decreases as the rate of elongation of the specimen increases. If the specimen elongates at a constant rate, the pendulum is not accelerated and the effect of elongation is merely to cause the upper clamp to move at a speed somewhat less than that of the lower clamp.

Fortunately, this angular acceleration of the pendulum seldom seems to be of importance. A hand-driven instrument carelessly operated or an automatically-driven instrument in need of adjustment may cause error due to this effect. Whenever the pendulum moves jerkily, trouble should be expected and the cause of the erratic motion eliminated. It appears that elongation of a paper specimen is seldom, if ever, rapid enough to cause a disturbing acceleration of the pendulum.

The mathematically inclined reader will note that when angular acceleration of the pendulum is effective, the instantaneous tension in the specimen is given by Equation 3, a modification of Equation 2:

$$T = (WR/r) \sin \theta + (I\alpha/r); \qquad (3)$$

I is the moment of inertia and α is the angular acceleration of the pendulum, and, for simplicity of expression, $r = r' + d$.

It has been pointed out by Carson *(2)* and by the Paper Testing Committee of the Technical Section of the Paper Makers' Association of Great Britain and Ireland *(3)*, among others, that the rate of loading—i.e., the increase in load per unit time commonly expressed in pounds per second or kilograms per second—of a specimen in a pendulum-type tensile tester is not constant when the stressing clamp moves with constant speed. This variation in rate of loading is due to the nonuniform scale of the instrument. Constant speed of the clamp demands constant speed of the pendulum, neglecting elongation of the specimen but, because of the relationship between load and angle shown by Equation 2, the increase in load per

unit time continuously decreases as the load increases. This change in rate of loading may be found for a particular instrument by noting that the rate of loading at any point on the scale is inversely proportional to the spacing of the divisions at the point. For example, on the 0—75-pound scale of a particular instrument, the distance between the 0- and 5-pound divisions of the scale was 1.06 inches, and the distance between the 60- and 65-pound divisions was 1.44 inches. The percentage decrease in rate of loading between loads of 2.5 and 62.5 pounds is given by Equation 4:

$$[(1/1.06) - (1/1.44)]\ 100/(1/1.06) = 26.4\% \qquad (4)$$

The corresponding values for the percentage decreases between 2.5 and 32.5 pounds and between 2.5 and 72.5 pounds are 7.0% and 37.8%, respectively. The rate of loading is thus seen to decrease more rapidly in the upper part of the scale. If the instrument has more than one range, the percentage changes in rate of loading are the same at corresponding points of all scales, since the percentage decrease depends on the angular position of the pendulum and not on the weight of the pendulum. The actual rate of loading, of course, depends on the weight of the pendulum and it is different for each scale, if the stressing clamp moves with the same speed.

The rate of loading also depends upon the elongation of the specimen. If the specimen elongates at a constant rate, the only effect is an apparent change in the speed of the stressing clamp. If the specimen elongates more rapidly as the load increases, the rate of loading decreases; this decrease in rate of loading is not dependent upon the effect described in the preceding paragraph. The net change in the rate of loading is the sum of these two independent effects. The decrease in rate of loading is particularly noticeable when testing certain types of paper in the cross-machine direction. The situation in which the specimen elongates less rapidly as the load increases is not of interest in testing paper, but it is of interest in the case of some other materials—e.g., rubber.

The driving mechanism for the lower clamp may be one of a number of types—namely, hand, gravity, hydraulic, pneumatic, or motor. In the hand-driven type a wheel or crank is turned by hand to operate a gear which draws the screw to which the clamp is fastened. In the gravity-driven type the rod connected to the clamp is directly connected to a heavy piston which falls into a closed cylinder at a rate governed by the rate at which air is bled from the cylinder through a valve. In the hydraulic or pneumatic types the rod connected to the clamp is directly connected to a piston which is moved in a cylinder by application of liquid or air pressure. In the motor-driven type the screw which holds the clamp is moved by a motor-driven gear. These same types of driving mechanism are used with the other types of tensile testers to be described later.

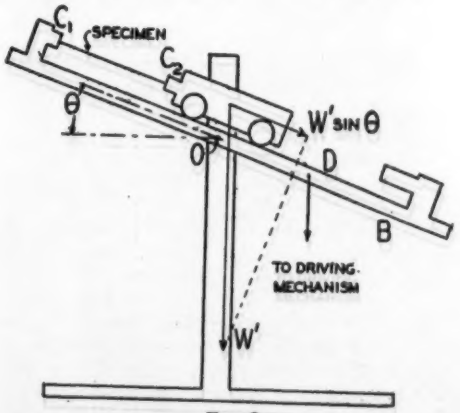


FIG. 2
The Inclined-Plane Type Tensile Tester

INCLINED-PLANE TYPE

The inclined-plane type of instrument is shown schematically in Fig. 2. A table or track B is pivoted at O and is free to rotate in a vertical plane. A clamp C_1 is rigidly fixed to the track and holds one end of the paper specimen. A carriage having weight W' is free to roll along this track. The wheels of this carriage are as nearly frictionless as possible. A second clamp C_2 is fastened to the carriage and holds the other end of the paper specimen. When the track B is horizontal the specimen is under no tension—i.e., its load is zero. When the track is tilted in the vertical plane by rotation about the axis O, the component of the weight of the carriage parallel to the track causes a tension in the specimen. As the angle of tilt of the table increases, the load increases; it would reach a maximum value equal to the weight of the carriage if the track were rotated to a vertical position. The load applied to the specimen is given by Equation 5,

$$T = W' \sin \theta, \qquad (5)$$

in which T is the tension in the specimen or the load on the specimen, W' is the weight of the carriage including the clamp and any other parts connected to and moving with the carriage, and θ is the angle the track makes with the horizontal. The track is ordinarily tilted by some automatic mechanism. The instrument is commonly equipped with a recording mechanism which traces the load-elongation curve of the specimen. There appears to be no reason why an instrument of this type could not be equipped with a direct reading tensile scale by the addition of an indicating mechanism generally similar to that used on the pendulum type of instrument. A shock-absorbing mechanism is provided to catch the carriage after the specimen breaks. The range of tensile strengths which can be measured on the instrument may be varied by changing the weight of the carriage.

The load on the specimen is not materially affected by changes in the rate of rotation of the track—i.e., acceleration effects analogous to those in the pendulum-type instrument caused by nonuniform motion of the stressing clamp are practically absent. Further, the load is not materially affected by centrifugal forces on the carriage; it is doubtful if the load is changed by as much as 0.001% by such forces, even if the carriage is considerably displaced from its normal position over the axis of rotation.

Change in the rate of elongation of the specimen causes acceleration of the carriage but, as in the case of the pendulum type of instrument, this acceleration is seldom large enough in paper testing to cause a serious error in the indicated load.

If the mechanism which rotates the track operates at constant speed—i.e., if point D in Fig. 2 is drawn downward at constant vertical speed—the rate of loading is constant. The point D actually moves along a circular path; this stipulation of constant downward speed means that the vertical component of the velocity of D is constant. The

. . . . THEY ENDED A

LUBRICATION NIGHTMARE

when they switched to

TYCOL STEAM CYLINDER OIL

In the words of one operator, "For the past six years we have been using Tide Water Cylinder Oil. During the entire period we have had no trouble of any kind with the engine. The troubles that once kept us on the run were eliminated six years ago." Another operator had this to say, "The trouble we had been having with our steam engine cleared up immediately when we changed to Tycol oils. Besides giving us better lubrication the lower consumption actually saved us 33⅓% of oil costs."

These men, like many others, have ended what were literally lubrication nightmares. Tycol Steam Cylinder Oil cured these troubles. This modern lubricant is made from 100% Pennsylvania crude. Its maximum chemical and physical stability, and flat temperature viscosity curve assure effective lubrication and sealing films with resulting economies.

Efficient lubrication assures untroubled engine performance for today's heavy production needs. If you're plagued by lubrication worries call in a Tide Water engineer. He will recommend the proper Tide Water lubricant "engineered to fit the job." Tide Water Associated Oil Company, 17 Battery Place, New York, N. Y.

DRUMS! DRUMS! DRUMS! DRUMS!
War needs make it extremely important that all empty drums be returned immediately.

INDUSTRIAL TYCOL OILS-GREASES

TIDE WATER ASSOCIATED OIL COMPANY
EASTERN DIVISION: 17 BATTERY PLACE, NEW YORK

MAKERS OF THE FAMOUS VEEDOL MOTOR OIL

relationship of the vertical distance y between the position of D at any time and its position when the track is horizontal to the angle Θ of the track is given by Equation 6,

$$y = f \sin \Theta, \qquad (6)$$

in which f is the distance of D from O. Equation 7 results from replacing sin Θ in Equation 6 by its value from Equation 5:

$$y = fT/W'. \qquad (7)$$

Since f and W' are constants, it follows at once that the rate of change of load is proportional to the rate of change of y. Hence, the rate of loading is constant if D is drawn downward with constant vertical speed. The rate of loading is not influenced by changes in the rate of elongation of the specimen.

HYDRAULIC TYPE

The hydraulic type of instrument is shown schematically in Fig. 3. A metal cylinder C is connected to a pressure gage G and holds a well-fitted piston P which exerts pressure on the liquid contained in the cylinder. A yoke Y bearing a clamp C_1 is so arranged that any load applied to C_1 is borne by the piston and the resulting hydrostatic pressure change in the liquid is indicated by the gage. The specimen is held by C_1 and a second clamp C_2 which is connected to a driving mechanism which draws it downward. The gage is equipped with an indicating needle which remains at the indication of the highest pressure attained during the test until turned back to the zero position by hand. The gage is calibrated to read directly the load applied to the specimen.

A variation in this type of instrument consists in replacing the piston by a flexible diaphragm D. Any force applied to this diaphragm is transmitted to the liquid as in the case of the piston. This variation is shown in Fig. 3.

In the hydraulic type of instrument the motion of the stressing clamp must be slow. If the clamp were

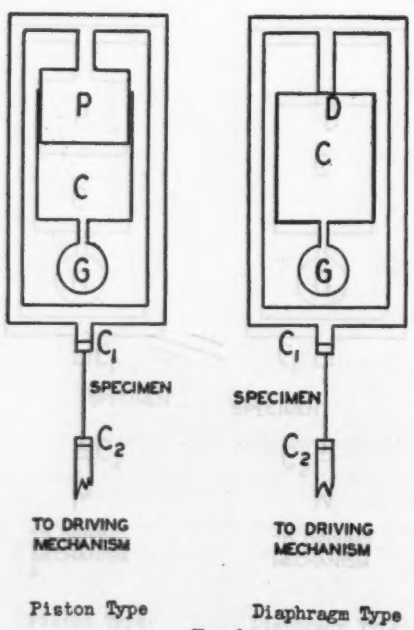


FIG. 3
The Hydraulic-Type Tensile Tester

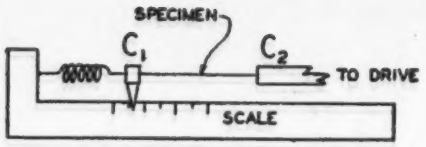


FIG. 4
The Spring-Type Tensile Tester

operated at the speed commonly used with pendulum-type instruments, the load would be applied much too rapidly.

Errors in the indicated load caused by acceleration of the yoke and piston when the clamp is not moved at constant speed or when the rate of elongation of the specimen increases are even less than in the pendulum type of instrument.

SPRING TYPE

The spring type of instrument is shown schematically in Fig. 4. This type is essentially a spring scale with an indicating mechanism which remains at the indication of maximum load when the specimen breaks.

The mass of the moving parts of this type of instrument can be so light as to make any effects caused by acceleration entirely negligible for the rates of testing which are of interest in the paper industry.

The scale of this type of instrument can be essentially linear—i.e., the scale divisions can be equally spaced. If the stressing clamp is drawn with constant speed, the rate of loading of the specimen is practically constant if the specimen elongates at an approximately constant rate. If the rate of elongation increases markedly, the rate of loading decreases as the load increases.

(To be continued)

No Restrictions on Paper Boxes

William M. Fitzhugh, chief, Setup and Folding Paper Box Section, Containers Branch of War Production Board, has issued a statement to the effect that in view of the present abundant supply of paper and paperboard, no restrictions on the manufacture of any type of paper box are contemplated and the use of gift and Christmas boxes are not prohibited.

At no time has any type of paper box been prohibited but many retailers have been purchasing boxes extremely sparingly, giving as their reason WPB's notice of last fall, urging conservation of paper and boxboard, even though they are cognizant of the fact that there has been a surplus of these raw products on the market, except during a relatively brief period last fall and winter.

Instead, stores send out their merchandise to customers in second-hand (at times patched up) boxes, bearing stickers citing the now age worn excuse that the boxes are used because of the Government's request to conserve paper.

Their action has gone a long way toward creating considerable unemployment, not only in paper box factories but in paper and board mills as well, they now being closed, for days at a time, due to lack of orders. Some producers of paper and board say they are less busy this summer than at any time since 1938, when they experienced a few slack periods. The weekly make of paperboard, this summer, is 75,000 to 100,000 tons less than during the fall of last year.

Preventive Maintenance

Preventive Maintenance—the "how" of how to keep his plant machinery running without breakdown or other troubles—is obviously to the fore in every plant manager's thoughts these days of "round the clock" operations.

Consequently, the abbreviated, "to the point" suggestions made by the Reliance Electric and Engineering Company, Cleveland, on a blotter (for handy reference) and widely distributed should be useful.

The A B C's of preventive maintenance have been condensed almost to the brevity of the "stop, look and listen" so familiar at railroad crossings. Certainly the next thing to it, the maintenance suggestions made consist of four admonitions—

Look—For oil, water, coolants, etc. that may be dripping or splashing onto windings . . . oil leakage from bearings . . . oil ring turning . . . poor commutation (on d-c) . . . loose springs on brushholders . . . obstructions to ventilation.

Listen—For slipping belts . . . noise due to loose pulleys, gears, couplings . . . noise due to rough commutator.

Feel—For abnormal heat . . . vibration . . . condition of commutator.

Sniff—For overheated insulation . . . injurious fumes.

All of the foregoing divisions could undoubtedly be elaborated on. And even with good inspection and proper operation it will unquestionably pay dividends to remove a motor once a year, take it apart and clean it thoroughly, giving the windings a spray coat of good insulating and oil-resisting varnish. Using a color in the spray coat helps show up dirt, oil, etc., on subsequent inspections.

While motors are apart, bearings can also be cleaned, inspected and changed, if necessary. Air gaps can be checked, and commutators, brushes, brushholders and other vital motor parts restored to A-1 condition.

Eastco Merchants Council Meets

BANGOR, Me., July 27, 1942—The Eastco Merchants' Advisory Council representing the nationwide group of paper merchants who sell Eastco papers, held a three-day meeting with mill officials of Eastern Corporation at Bangor, that convened Wednesday and continued through Friday, July 22, 23 and 24.

A general discussion of wartime policies and procedure in mill and merchant relations took place at the meetings, and an advertising and merchandising program for 1943 was submitted for consideration.

Due to the rapidly changing wartime conditions, the meeting proved to be especially helpful and worthwhile this year for both Eastern Corporation and its customers.

Wednesday evening the visiting merchants were entertained at a dinner-party held at the home of Clyde B. Morgan, president of Eastern Corporation.

Eastco merchants attending the meeting were Harold W. Keil, president, Millcraft Paper Company, Cleveland, Ohio; James S. Wagnon, Olmstead-Kirk, Dallas, Texas; Edwin D. Hourigan, secretary, Smith Paper Company, Albany, N. Y.; Leon W. Poore, treasurer and general manager, John Carter & Co., Boston, Mass.; Edward H. Kniep, vice president, Shaughnessy-Kniep-Hawe Paper Company, St. Louis, Mo., and Arthur W. Pohlman, president A. W. Pohlman Company, New York City.

Canada Saving Wrapping Paper

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., July 27, 1942—The success of the waste paper campaign is reflected in a statement by C. V. Hodder, waste paper administrator, that salvage organizations have collected such large quantities of old newspapers that there's enough of a surplus on hand to last for some time.

The situation is not quite so satisfactory regarding other types of paper, however, and there is still a great need for the saving of wrapping papers, cardboard and corrugated boxes. A circular has gone out to salvage committees suggesting that housewives be encouraged to use old newspapers for all household purposes, but to save every bit of brown wrapping paper, bags, etc. Corrugated paper is still being imported from the United States to help supply the great demand for shipping cartons, particularly for munitions.

Mr. Hodder states that so far as he has been able to ascertain, there is no foundation for stories that tons of old newspapers have been burned in Canada because the material could not be used. It is understood that this has been done in several American cities where storage facilities were inadequate. Exposure to weather causes old newspapers to flake and disintegrate. There have been some reports about paper waste having been left outside and allowed to deteriorate, but Mr. Hodder says that outside of old newspapers, deterioration in wastepaper is slight, running only about 1 per cent a year where tarpaulins are used as a protection. It is cheaper to take this loss than to build permanent storage facilities, especially under wartime conditions.

The current newspaper surplus is partly seasonal. Newspaper waste collections increase before people go on vacation and fall off through the summer, but increase again when the holiday season is over.

C. T. Elliott Jr. Made Sales Manager

The D. M. Bare Paper Company, Roaring Spring, Pa., announces that Charles T. Elliott, Jr., has been selected as sales manager, effective July 15, 1942. Mr. Elliott brings with him a well rounded knowledge of the paper industry, having had experience not only in fine papers but special papers as well.

Up until his present association with D. M. Bare Paper Company, Mr. Elliott was connected with the American Writing Paper Corporation, where he was a member of the Sales Department for four years. Prior to this, he had been associated with the Sales Department of the Port Huron Sulphite and Paper Company, the Fletcher Paper Company and the Riegel Paper Corporation.

Before following his father's footsteps in the paper industry, Mr. Elliott attended the Hill School, graduating from Phillips Exeter Academy and entered Princeton University with the class of 1928.

Arnold-Roberts Co. Moves

BOSTON, Mass., July 27, 1942—The Arnold-Roberts Company, fine paper merchants, have removed its sales office for the duration from 58 High street to 78 West Second street, South Boston, where warehouse is located. The removal was necessitated because the Government has taken over nearly all of the United Shoe Machinery Building, including the Arnold-Roberts offices.

Plan More Hydro-Electric Power

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., July 27, 1942—Among the efworts which Canadian making to increase its hydro-electric power production, in order to meet the growing needs of war industry, two major developments are attracting attention—that of the Shawning an Water and Power Company and its associates on the St. Maurice River, in Quebec's centre of the newsprint industry, and the scheme whereby additional water will be diverted into the St. Lawrence waterway system and production at existing plants increased.

On the Ct. Maurice River, farsighted plans in continuous developments have kept power supplies a jump ahead of demands, and with important new developments being rushed, new supplies are in the offing. The situation here, and indeed throughout the Province is exceptionally good as far as water supply is concerned. The huge storage dams at the headwater of the principal rivers being full being full, as the result of copious rainfall.

The improvement of the flow in the St. Lawrence Waterway System is expected to come into operation next summer. This is to be brought about by a $5,000,000 project for diverting the waters of the Ogoki river and Long Lake, which now empty into James Bay, into Lake Superior. Work onthis project is making rapid progress.

It is estimated that the diversion of these waters into Lake Superior will raise the water bends of the Great Lakes by approximately 2½ inches. This will mean that much greater clearance for lake freighters, and benefit shipping by some $1,000,000 a year. The increased flow of water will permit the development of 10,000 additional horsepower at Sault St. Marie, a maximum of 150,000 h.p. on the Niagara River, 40,000 on the St. Lawrence River in Ontario, and 50,000 h.p. on the St. Lawrence River in Quebec, on a grand total of 360,000 h.p.

Claim Canadian Dollar as Basis

A large number of cases have been initiated by importers of groundwood and other dutiable printing papers in which they claim that duty should be computed on the basis of the commercial value of the Canadian dollar, and not on the basis of the official rate of exchange. New cases according to Warren B. Bullock manager of the Import Committee of the American Paper Industry involve ten shipments of novel news, one of dutiable newsprint and one of side runs.

The British purchase tax, equivalent to what is known in the United States as a sales tax, has been increased to 66 2/3 percent. The increased tax applies to converted paper products, however, and not to the raw material. The tax on certain goods formerly subject to 16 2/3 per cent tax has been increased to 33⅓ per cent. The 33⅓ tax applies to account and plain note books. The 66 2/3 per cent tax applies to such goods as dairies, clendars, greeting cards, papeterie, paper napkins and towels, duplicating paper, letter heads, etc. This tax is added to the domestic prices for such merchandise, to fix the base on which ad valorem duties are computed.

A Presidential order will permit the duty free importation of emergency purchases of war material abroad, if such purchases are made directly for the War, or its subsidiaries. It would appear from the text of the order that this duty free privilege applies only to direct Government purchases and does not include any merchandise imported for the use of commercial corporations, even if eventually for the filling of war contracts. The order has already become effective.

Hercules Employs Women Chemists

To handle an expanded research program 90 per cent devoted to the war effort, Hercules Powder Company has employed a group of women chemists and also instituted a night research shift at its central Experiment Station laboratories.

This wartime basis for chemical research operations was announced recently by Dr. Emil Ott, in whose three years as director of Hercules research its staff has been doubled and its sphere of laboratory investigation widened.

There are more than 204 trained chemists and a total research staff of more than 600 men and women now working in the 15 buildings located on a 300-acre plot of land on the outskirts of Wilmington, Del. Research expenditures at this Experiment Station in 1942 will approximate $1,500,000.

The women chemists, it is stated have displayed patience and dexterity—two key talents of the laboratory workers, who muts tabulate thousands of observations with diligent accuracy, and who must at all times be careful of delicate and valuable laboratory equipment.

To secure this group of chemists, Joseph M. McVey, personnel director, began immediately after Pearl Harbor to sign up the top-notch women seniors in colleges all over the country.

They have come from the campuses of Vassar, Mt. Holyoke, Oklahoma, Delaware, Syracuse, Elmira, Drexel, Wilson, Berry, Illinois, Indiana, Northwestern, Brenau, Western Maryland, Bryn Mawr, Washington College, Dickinson, Goucher, Penn State, Bucknell, Norht Carolina, Hood, Chattanooga, Carnegie Institute of Technology, Willamette, Pennsylvania, Cornell, and Wellesley.

White Returns to M. M. Elish & Co.

Abe White, who conducted the A. White Paper Company for the past twenty-two years has returned to his old position of salesman for M. M. Elish & Co., 29 Beekman Street. Mr. White was with Elish from 1905 to 1920 when he went into business for himself.

Abe will be glad to hear from the many friends he has acquired in the printing business during his thirty-seven years in the field.

To Go With Geo. W. Millar & Co.

Geo. W. Millar & Co., Inc., 284 Lafayette street, New York City announce that Leonard A. Galante will join their paper mills supplies department as assistant to Walter H. Martens, manager of the department. Mr. Galante is well known to the paper stock trade, having been in business for a good many years with his late father D. Galante, who was a well known packer of new cotton rag cuttings in New York. Mr. Galante's many friends will wish him success in his new position.

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending July 27, 1942

STOCKS

	High	Low	Last
A. P. W.	....	....	....
Armstrong Cork Co.	28	27½	27½
Celotex Corp.	7	6¾	6¾
Celotex Corp., pf.	....	....	....
Certain-Teed Products Corp.	1⅞	1⅞	1⅞
Certain-Teed Products Corp., pf.	27	25½	25⅞
Champion Paper & Fibre Co.	14¾	14¾	14¾
Champion Paper & Fibre Co., pf.	99	98	98
Congoleum Nairn Co.	15⅛	14¾	15⅛
Container Corp. of America	12½	12	12½
Continental-Diamond Fibre Co.	6¾	6¾	6¾
Crown-Zellerbach Co.	10¾	10½	10¾
Crown-Zellerbach Co., pf.	81¾	80¼	81¾
Dixie-Vortex Co.	8¾	8¾	8¾
Dixie-Vortex Co.—A.	35¼	34½	34½
Flintkote Co.	11⅛	11	11¼
Robert Gair	1¾	1⅝	1⅝
Robert Gair, pf.	....	....	....
International Paper Co.	10⅛	9⅝	9¾
International Paper Co., pf.	50⅞	49¼	49¼
Johns-Manville Corp.	57⅜	56	56¾
Johns-Manville Corp., pf.	....	....	....
Kimberly Clark Corp.	....	....	....
MacAndrews & Forbes	16⅜	16⅜	16⅜
MacAndrews & Forbes, pf.	....	....	....
Masonite Corp.	27	26¾	27
Mead Corp.	6½	6⅜	6½
Mead Corp., pf.	....	....	....
Paraffine Companies, Inc.	29½	28	28
Paraffine Companies, Inc., pf.	....	....	....
Rayonier, Inc.	9¾	9¼	9¼
Rayonier, Inc., pf.	24¾	24½	24⅝
Ruberoid Co.	18¼	17⅞	18¼
Scott Paper Co.	33	32½	32¾
Scott Paper Co., pf.	....	....	....
Sutherland Paper Co.	22	21¾	21¾
Union Bag & Paper Corp.	8¾	8⅛	8⅛
United Paperboard Co.	3⅛	3⅛	3⅛
U. S. Gypsum Co.	54½	51½	51½
U. S. Gypsum Co., pf.	169¼	169¼	169¼
West Virginia Pulp & Paper Co.	....	....	....

BONDS

Abitibi Pulp & Paper Co. 5s '53	50⅛	50	50¼
Celotex Corp. 4½s '47	98¾	98	98¾
Certain-Teed Products Corp. 5½s '48	91¼	89⅛	90¼
Champion Paper & Fibre Co. 4¾s '50	103¾	103	103
International Paper Co. 6s '55	104¾	104¼	104¾
International Paper Co. 5s '47	104½	103⅞	104
Mead Corp. 4½s '55	....	....	....
West Virginia Pulp & Paper Co. 3s '54	....	....	....

New York Curb Exchange

High, Low and Last for Week Ending July 27, 1942

STOCKS

	High	Low	Last
American Box Board Co.	3¾	3¾	3¾
Brown Co., pf.	....	....	....
Great Northern Paper Co.	....	....	....
Hummel-Ross Fibre Corp.	3	3	3
National Container Corp.	8⅛	8⅛	8⅛
St. Regis Paper Co.	1¾	1⅜	1⅜
St. Regis Paper Co., pf.	....	....	....
Taggart Corp.	2⅜	2¼	2⅜

BONDS

American Writing Paper Co. 6s '61	84	84	84

Nekoosa-Edwards To Issue Bonds

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., July 27, 1942—Refinancing of the bonded debt of the Nekoosa-Edwards Paper Company, Port Edwards, Wis., through the issuance and sale of $1,500,000 of first mortgage bonds was approved by stockholders attending the company's annual meeting at the company's offices Wednesday, July 15. The proposal was presented by John E. Alexander, president and general manager, who said the plan would provide for a bond issue bearing interest rates of 3 and 3½%, replacing the present first mortgage 4½% sinking fund bonds.

"It was the desire of the company," Mr. Alexander said, "to issue and sell $1,500,000 first mortgage bonds of the company, the net proceeds of which are to be used to redeem and purchase on August 4, 1942, the outstanding first mortgage 4½% sinking fund bonds." The purpose includes not only the reduction of interest, but other attractive features that do not exist in the present indenture. A substantial saving over a period of years will result.

Two insurance companies, the Northwestern Mutual Life Insurance Company of Milwaukee, Wis., and the Aid Association for Lutherans, Appleton, Wis., which hold all the present outstanding bonds, will purchase the new bonds. Arrangements for the deal were worked out in conjunction with Harris Hall & Company, Chicago. The new issue provides for serial bonds payable $100,000 per year for 15 years. The bonds will be secured by a first lien on the present and future real estate of the company, excepting timber, forestry lands and residential property.

Directors elected by the stockholders are Mr. Alexander, Guy O. Babcock, C. A. Jasperson, J. B. Nash, L. M. Hanks, A. S. Puelicher and Judson G. Rosebush. The directors reelected the officers, including Mr. Alexander as president, Mr. Babcock as vice-president, and Mr. Jasperson as secretary-treasurer.

Mr. Alexander reported operations for 1941 as "most satisfactory, but due to the existing war conditions the future presented considerable uncertainty."

Gair Reports $381,512 Profit

The Robert Gair Company and United States subsidiaries, report for the six months ended June 30, 1942, a profit, after depreciation, interest and dividends of subsidiary company, and provision of $1,538,000.00 for federal income and excess profits taxes but before interest on income notes, of $381,512.59.

The provisions for federal taxes represent one-half of the estimated amounts of such taxes for the entire year based on the earnings for the six months, extended to a year and computed at the rate of 87½% for excess profits tax and 45% for normal income tax and surtax.

Gair Company Canada Limited, wholly owned subsidiary of Robert Gair Company, Inc., reports for the six months ended June 30, 1942, profit, after provision of $192,000.00 for Canadian income taxes, of $165,137.99 in Canadian dollars, which are not included in the above.

Due to the discount on exchange of Canadian dollars into United States currency, issue of a consolidated statement of earnings is impractical.

New Consolidated Bond Issue Sold

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., July 27, 1942—Stockholders of the Consolidated Water Power and Paper Company held their annual meeting at Wisconsin Rapids, Wis., Wednesday, July 22, at which George W. Mead, president, reported on the progress of the company's Du Bay power project at Knowlton, Wis.

He announced that construction is nearing completion, with generators and water wheels now in the

process of installation, and all other machinery on hand.

To finance the Du Bay project, stockholders were informed that $1,832,000 of 3¾% bonds of Consolidated Water Power Company were called, and a new issue of 3½% bonds totalling $3,400,000 were sold to insurance companies, according to the report of Ralph R. Cole, secretary.

Stanton W. Mead, vice-president and general manager, reported that the general slump experienced in recent months by the paper industry has not affected Consolidated's operations thus far. His report and that of Walter L. Mead, vice-president in charge of sales, showed that Consolidated mills are running at full capacity, with prospects for the near future pointing to continued operations at the present level.

Officers were reelected as follows: George W. Mead, president; Stanton W. Mead, vice-president and treasurer; Walter L. Mead, vice-president; Ralph R. Cole, secretary, and T. W. Brazeau, director. Others reelected were Thomas A. Duda, comptroller, and F. Harold Murtfeldt, assistant secretary.

A. W. P. Earnings Up

Net profit of the American Writing Paper Company for the first half of 1942 was almost 55 cents a share, against 23 cents for the corresponding 1941 period, according to the pamphlet report released yesterday. The report provides for estimated Federal taxes at the composite rate of 56.8%

For the six months, the company had sales of $3,711,968, gross profit on sales of $885,168, net operating income of $568,654 and net income before Federal taxes of $482,511. This last figure contrasted with $195,397 in the corresponding 1941 period.

Crown Zellerbach Earns $2.85

The Crown Zellerbach Corporation and subsidiaries for the fiscal year ended April 30, 1942, reports sales of $86,336,000, compared with $68,226,000 year ago; net income $9,108,801, after taxes and charges, equal after preferred dividends to $2.85 a share on 2,261,-199 common shares; year ago $8,866,287 and $2.75 a share.

Dixie-Vortex Nets $1.89

The Dixie-Vortex Company and subsidiaries for the twelve months to June 30, reports a net income of $828,902, equal, after dividend requirements on $2.50 Class A stock, to $1.89 each on 202,666 common shares, against $888,183, or $2.18 a common share for twelve months to June 30, 1941.

Celotex Votes Dividend

The Celotex Corporation voted a dividend of 12½ cents a share on the common stock, payable August 8 to stockholders of record August 3. Previously, payments of 25 cents a share quarterly were made.

Col. Hansen Goes to Camp Croft

BOSTON, Mass., July 27, 1942—Edwin Hansen, salesman for the Cook-Vivian Company, is now in the Eighth Regiment of the United States Army with the rank of Colonel, and is stationed at Camp Croft, South Carolina.

New Products and New Uses For Old

Frozen Eggs in Cellophane Saving Tons of Metal

Frozen eggs are now being packaged in cellophane, with an outside overcoat of cardboard, as a further contribution to the metal saving program.

Egg-freezing is an important factor in the business of feeding the nation and its allies. Estimates for 1942 run to a new peak above 350,000,000 pounds, or 3,430,000,000 eggs. Bakeries, restaurants and other domestic consumers receive the eggs either still in the frozen form or after they have been defrosted and dried. Lend-lease shipments are in dried form, and are becoming constantly more important, because of the high nutritional value in proportion to weight and bulk.

Heretofore, eggs were removed from the shells, poured into tin cans, holding 30 pounds each, and then frozen and stored. Because of the metal shortage, more than a score of egg-packers have turned to a new paperboard containers lined with Du Pont moisture-proof cellophane. The tin cans previously used required two pounds of metal each. The cellophane-lined containers have no metal at all, except for wire stitching in some instances. Thus substantial tonnages of tin and steel are being saved for direct war uses.

The new container, which is actually a leak-proof cellophane bag inside a fiberboard box, weighs approximately 30 per cent less than metal. It is rectangular instead of round, saving much shipping space. This permits carrying more frozen eggs in each refrigerator car.

The new cellophane-lined bulk carton is also being tested and in some cases being used for other foods, such as prepared pie fillings, oleomargarine, jellies and various frozen and dehydrated foods.

Glycerin Alternate

Glycerin, which has an almost endless string of industrial and commercial applications, is being diverted 100% to war purposes. To replace it in many of its applications, Akerite Chemical Works, Inc., 6035 Northwest Highway, Chicago, has fomulated Akerite Glycerin Alternative, an aqueous, nontoxic liquid derived mainly from corn.

It is soluble in alcohol, water, and glycerin; nonsoluble in petroleum solvents. Like glycerin it attracts water during storage and has a low freezing point. It has already been tried out in the manufacture of printing rollers, paper, leather, cosmetics, shaving cream, foundry cores, sausage casings, textiles, photographic supplies, embalming fluid, rubber goods, various inks, etc.

Many wall paper manufacturers it is said as well as writing papers, bond papers, etc., are now using glycerin alternate in place of true glycerin. One large wall paper company states that certain features of this substitute were superior to glycerin.

Acquire Northern Kraft Corp.

HOWLAND, Me., July 27, 1942—The ownership control of the Northern Kraft Corporation was recently purchased by the Gilman Paper Company, and all original officers and directors have severed their connection with the company with the exception of Ernest A. Kendler, who remains at Howland, Maine, as treasurer and resident manager. Before participating in the organization of the Northern Kraft Corporation, Mr. Kendler had been associated with the Gilman Paper Company for the past twenty-five years, as secretary.

The Northern Kraft Corporation is now operated as an affiliated company of the Gilman Paper Co., as is the St. Mary's Kraft Corporation, of St. Mary's, Georgia.

Container Corp. Changes

The Container Corporation of America, Chicago, announces the following organization changes effective as of July 1, 1942:—

Mr. J. V. Spachner, a vice-president of the company, becomes head of the Western Container Division, with offices at 111 W. Washington street, Chicago. He will retire from the presidency of the Pioneer Paper Stock Company and also as head of the purchasing, traffic, and transportation departments. He will continue to supervise the operation and sales of the Fernandina pulp mill as well as all pulp buying for the corporation. F. J. Sauer will continue to assist Mr. Spachner in the purchase and sale of pulp.

Arthur U. Clanghorn, vice-president of Pioneer Paper Stock Company, is promoted to the office of president of that company.

E. I. Orr becomes vice-president of Pioneer Paper Stock Company, and continues in charge of its Eastern Division.

Arthur J. Furth, presently secretary of Pioneer Paper Stock Company, becomes vice-president.

H. C. Pearson becomes secretary of Pioneer Paper Stock Company and continues in charge of the Michigan Division.

The purchasing, traffic and transportation divisions will continue with their present duties and responsibilities, under the leadership of W. D. Jackson as purchasing agent and Mr. Gail Gordon as traffic manager.

Start Ground Wood Mill at Clermont

Scott Paper Company of Chester, Pa., in connection with Donohue Brothers, Ltd., has put into operation a groundwood pulp mill at Clermont, Province of Quebec, Canada. John Stadler of Montreal was the designing and construction engineer. Pulp from this new source will be of the highest quality and is vitally necessary to the increasing demand for paper products of the Scott Paper Company, together with its subsidiaries at Marinette, Wis., and Glens Falls, N. Y.

Carton Bureau Not To Hold Outing

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., July 27, 1942—The Carton Credit Bureau has decided not to hold an outing this year, due to war conditions.

Today you cannot get those Roberts Grinders you were thinking about a year ago. New jordans are for gun powder instead of paper. Now it is the little things that are important, small repairs and replacements, rolls and fillings. Paper mill machinery is only a small part of our total production in 1942, but it is as important to us as it is to you. It is all that we are allowed to do now for the industry with which we have been so closely associated for more than 50 years. We are looking ahead and preparing for the time when serving the paper industry again will be our full time job. We will be better equipped than ever before. In the meantime we are glad to put in longer hours, add more men and new machinery for our part in speeding the victory that will bring that day closer.

ROBERTS Continuous GRINDER

THE APPLETON MACHINE COMPANY
APPLETON WISCONSIN

OPA Issues Paper Box Prices

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., July 25, 1942—Maximum prices, which will reflect price levels existing from October 1 to 31, 1941, for the sale of many paperboard products produced by manufacturers in the folding carton and set-up box industry and the corrugated and solid fibre container industry, are determined by Maximum Price Regulation No. 187 issued today by Price Administrator Leon Henderson.

Today's action enables approximately 2,000 manufacturers to compute their top prices for folding cartons, corrugated fibre sheets, corrugated fibre boxes, solid fibre sheets, solid fibre boxes, set-up boxes, pads, partitions and other paperboard products partially or completely manufactured on the same converting equipment. The regulation does not cover liquid tight containers, milk bottle caps, book matches, and other commodities which are covered by Maximum Price Regulation No. 129. Sales by distributors and retailers remain under the provisions of the General Maximum Price Regulation.

Also covered by the regulation, which becomes effective July 30, 1942, are all manufacturers' services in connection with the manufacture of such products.

"A few of these manufacturers had raised prices so that they were selling their products at prices higher than those which generally prevailed and in excess of the October levels.

"The regulation issued today will end this inequity and all manufacturers will be required to price their products according to the same formula based on the October 1941 period."

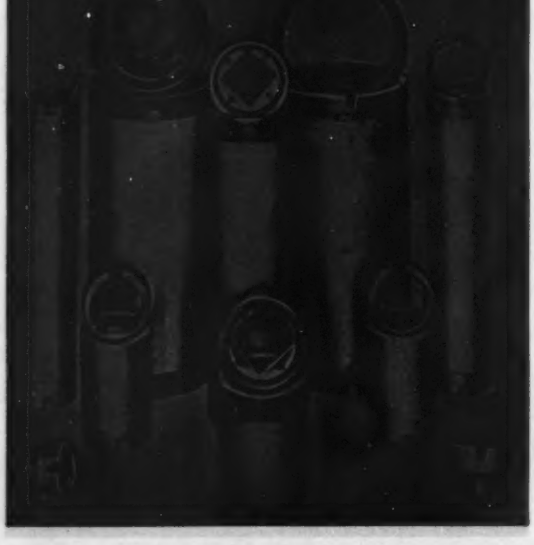
In effect, the regulation prescribes a formula in which four major factors are added to determine the maximum price. These factors are specifically set forth and described in the regulation as—(a) raw materials costs, (b) conversion charges, (c) margin, and (d) charges for delivery.

The "raw materials cost" cannot exceed the maximum prices established by OPA for such raw materials. This "factor" is the delivered purchase price at which raw materials are acquired by a converting plant or the transfer price of an integrated mill to its converting plant. Transfer prices, when applicable, must be computed in the same manner as used by the manufacturer in determining his transfer prices during the October 1941 period.

Applicable conversion charges—the charges covering the normal operations used in producing the commodity or the service to be priced, the second factor which may be added in the prescribed formula—are charges for hand or machine operations in connection with fabrication, assembly, marking and packing of commodities in the same general class, all of which are defined in the regulation.

In applying these charges the same hourly, piece and setting up rates and the same standards of production, as defined in the order, as were in effect during October 1941, must be used. The procedure used in estimating conversion costs in October 1941, shall be applied now in applying conversion costs permitted under the regulation.

The margin is computed as set forth in the regulations on a percentage basis or "rate per unit of base material." The margin is the same used by the manufacturer in October, 1941, in determining his selling price f.o.b. shipping point for the same or similar



ELIXMAN

CAPS

Straight wound paper cores made in sizes from 2" to 10" inside diameter with any thickness wall required.

Long draw protected slot caps of heavy gauge steel in all standard sizes.

Heavy duty caps with reenforced square hole. This patented feature of reenforcement gives added strength and durability.

CORES

Samples of caps or cores will be gladly submitted

ELIXMAN PAPER CORE COMPANY, INC.

CORINTH, N. Y.

commodity or service contracted to be sold at a definite price to a purchaser of the same class during the base period. Customary allowances, discounts and other price differentials must remain the same unless a lower price results.

New Literature

Recording consistency control is discussed in a bulletin issued by Paper and Industrial Appliances, Inc., 122 East 42nd street, New York. It explains why and how the system provides an accurate and dependable record and control of consistency of pulps, paper stocks, and viscous liquids.

Wartime care of electric motors, is the subject of a handbook issued by the Allis-Chalmers Manufacturing Company, Milwaukee, Wis. This is a maintenance book, treating separately each factor opposing long and trouble-free motor service. A quick diagnosis of motor failures with suggestions of possible causes and remedies is included.

Industrial and municipal water is discussed in a water handbook issued by W. H. & L. D. Betz, Gillingham and Worth streets, Frankford, Philadelphia, Pa. It covers the subject in considerable detail and discusses 25 different methods of water analyses, such as hardness, alkalinity, phosphate, sulphite, turbidity, oil, calcium, etc. Bacteriological analyses are not included. Interpretations of tests and their applications to plant control and technical graphs are given.

Control in purchasing is discussed in a booklet issued by the Wassell Organization, Westport, Conn. It describes the Product-trol system, which utilizes a black visualization board in scheduling machine loading, purchasing, production, assembly, etc. Each item is controlled individually.

Torque versus horsepower and overhung loads on speed reducer shafts, are two booklets issued by the engineering department of Winfield H. Smith, Inc., Springfille, N. Y. Written in non-technical language, they cover these important subjects in a comprehensive manner and are of special interest to users of speed reducing units.

Morocco Supplies More Paper

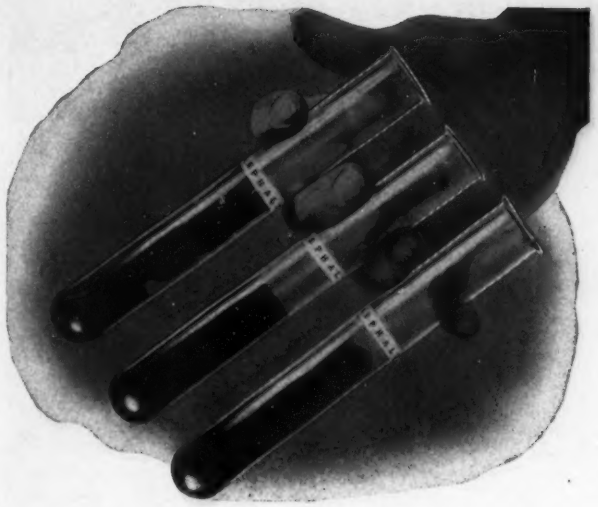
The paper industry in Morocco has undergone expansion to the extent that four plants in the protectorate are now able to supply the 12,000 to 15,000 tons annually required, says a report to the Department of Commerce. Reports indicate that the plants could even produce enough paper for export if operated at capacity levels.

Wood is scarce in French Morocco, it is said, but other raw materials, wheat and barley straw, hemp, brush and branches, waste newsprint and rags are plentiful.

Research has been conducted into the use of reed stems for raw materials, the reeds growing in abundance in the protectorate. Other raw materials may come from the "parssolier", a species of palm, which grows in French West Africa.

The latter material returns approximately 45 per cent cellulose from its fiber and the chief advantage in its use is that it is not destroyed by cutting, producing utilizable shoots after two years.

Two of the four producing companies are located at Casablanca, one at Port Lyautey, and the other two at Sidi Sliman, the latter manufacturing pulp only.



YES, YOU CAN GET ASPHALT SPECIALTIES FOR PAPER PRODUCTION

Are you having difficulty getting sufficient asphalt specialties?

Wishnick-Tumpeer, Inc., offers you prompt delivery from two strategically located plants. We have available now a complete line of asphalt specialties for use in waterproofing, saturating, laminating and coating paper and paper products. We can also make delivery on a diversified list of asphalt compounds produced to meet the special requirements of individual paper manufacturers. All are made from carefully selected raw materials and processed to exact specifications.

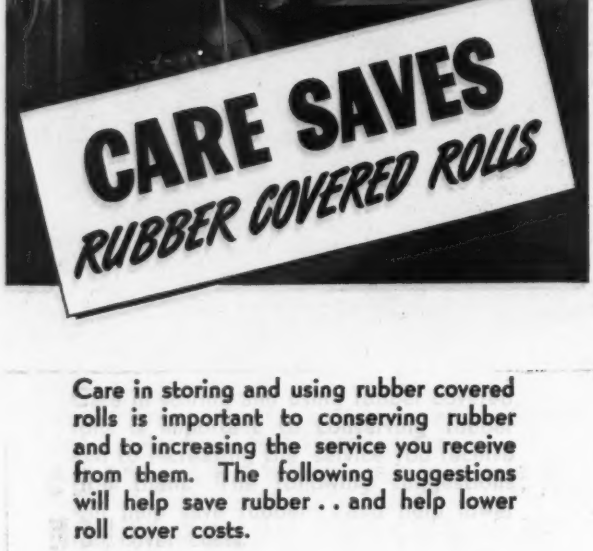
These are PIONEER ASPHALTS. Pioneer is a name known for more than four decades for outstanding quality and top-notch service in asphalts. Due to the fact that our plants are new and up-to-the-minute in equipment, we are today supplying an unprecedented volume and variety of asphalt compounds for use in construction, materials and protective coatings for countless vital war needs.

But your needs can be met, too. And you can benefit by the experienced aid of our staff in determining the specifications and selecting the right asphalt specialties for your individual requirements. Get in touch with Wishnick-Tumpeer, Inc., NOW.

WISHNICK - TUMPEER, INC.

MANUFACTURERS AND EXPORTERS

New York, 295 Madison Avenue • Boston, 141 Milk Street • Chicago, Tribune Tower • Cleveland, 616 St. Clair Avenue, N. E. • Witco Affiliates: Witco Oil & Gas Company • The Pioneer Asphalt Company • Panhandle Carbon Company • Foreign Office London, England



Care in storing and using rubber covered rolls is important to conserving rubber and to increasing the service you receive from them. The following suggestions will help save rubber . . and help lower roll cover costs.

- Grind covers frequently enough to keep surface smooth and height of crown correct. Regrinding ultimately saves rubber and adds service.
- Do not overweight rolls to compensate for heavy crown wear . . this causes corrugation of the cover and premature removal from service. Remember, too, corrugation accelerates rapidly after it is once started.
- Do not permit oil to come in contact with rubber cover . . it is destructive.
- Keep foreign matter from falling on rolls . . a metal part, however small, will ruin a cover if it passes between rolls under pressure.
- When storing rubber covered rolls, wrap them in paper and store in a cool, dark, dry room.

Cincinnati Rubber Covered Rolls have a nation-wide reputation for doing an outstanding job . . . for excellent service. You'll get even better service if the above points are carefully considered and put into effect.

THE CINCINNATI RUBBER MFG. CO.
Cincinnati, Ohio

CINCINNATI
RUBBER COVERED ROLLS

Mills Receive Reservoir Assessments

[FROM OUR REGULAR CORRESPONDENT]

GLENS FALLS, N. Y., July 25, 1942—Paper mills and other manufacturing concerns in this section have received notice of their annual tax levy in connection with the construction and cost of the huge Sacandaga reservoir. Among the concerns receiving great benefit from the reservoir are the West Virginia Pulp and Paper Company, New York Power and Light Company, Ford Motor Company, Fort Miller Pulp and Paper Company, International Paper Company, Union Bag and Paper Company, New York Power and Light Company and the United Paper Board Company. The assessments for the various counties show Saratoga leading with $86,912.50; Warren county, $17,845; Washington county, $11,416.25, and Albany, $6,192.50. The reservoir was constructed by the state several years ago at a cost estimated at about $12,000,000 and has already proven of immense value to paper mills by allowing them to keep in operation during periods of drouth. It has also virtually eliminated all danger from flood throughout the state. Only recently the water level in the reservoir was recorded as the lowest in its history because of the supply being sent to paper mills in this section. It is claimed that manufacturing concerns have already saved thousands of dollars while property damage from floods throughout Northern New York has also been abolished to a great extent.

Switzerland Uses More Paper

Paper consumption in Switzerland now stands at 20 per cent above prewar levels, largely because of its increased use as packing material, according to a report to the Department of Commerce. Newspapers, also, are using increased amounts of newsprint.

Paper is in great demand for packing, it is said, replacing metal containers, cotton bags and burlap. Government needs have also continued to grow.

Newspapers have increased circulations, particularly after the war opened on the Russian front, but sufficient amounts of newsprint have been available so far.

Paper prices in general have gone up, the average advance amounting to about 32 per cent since the outbreak of the war. First notable increase in prices took place in September of last year, when prices rose 15 per cent after remaining stationary for almost two years.

KRAFT PAPER PRICES REDUCED

(Continued from page 7)

minimum differential used between January 1, to October 15, 1941. Such differentials must be reported within ten days after the first sale with accompanying data to O.P.A. and may be disapproved or adjusted.

In all sales excepting those to other distributors the maximum mark-ups which distributors or jobbers can add to the manufacturer's prices are specifically set forth in the regulation as follows:

MERCHANTS' OR DISTRIBUTORS' MAXIMUM SELLING PRICES

Quantity in pounds:	Per cwt.
Less than 375	$2.50
375 to less than 750	1.50
750 to less than 1,500	1.25
1,500 to less than 7,500	1.00
7,500 to less than 15,000	.75
15,000 to less than 30,000	.50
30,000 or more	.25

U. S. Paper Bids

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., July 29, 1942—The Government Printing Office has received the following bids for 86,000 pounds of 20 x 25 tan bristol board; R. P. Andrews Paper Company, 9.75 and 9.6 cents; Marquette Paper Company, 10 cents; Paper Corp. of U. S., 8.92 cents; and Whitaker Paper Company, 5.25 cents.

For 20,100 pounds of 21 x 32 white sulphite ledger paper; Aetna Paper Company, 8.22 cents; R. P. Andrews Paper Company, 7.14 cents; Baxter Paper Company, 7.51 cents; Butler Company, 7.38 cents; Marquette Paper Company, 6.52 cents; Mudge Paper Company, 7.14 cents; Paper Corp. of U. S., 9.25 cents; Perkins-Goodwin Company, 7.84 cents; Stanford Paper Company, 6.6 cents; Walker Goulard Plehn Company, 7.65 cents; Whitaker Paper Company, 6.82 cents; Wilcox Walter Furlong Paper Company, 8.7 cents; Bradner Smith & Company, 7.65 cents; Bulkley Dunton & Co., 7.5 cents; Bermingham & Prosser Company, 7.16 cents; D. L. Ward & Company, 7.8 cents; Garrett Buchanan Company, 8.67 cents; and Eastern Corporation, 6.8 cents.

For 40,991 pounds of 50% rag, 32½ x 42 white ledger paper; R. P. Andrews Paper Company, 12.87 cents; Barton, Duer & Koch Paper Company, 12.63 cents; Cauthorne Paper Company, Inc., 12.87 cents; Marquette Paper Company, 13.32 cents; Mudge Paper Company, 13.1 cents; Paper Corp. of U. S., 13.29 cents; Stanford Paper Company, 12 cents; Walker Goulard Plehn Company, 11.99 cents; Whitaker Paper Company, 13.95 cents; Bulkley Dunton & Company, 14.75 cents; Coy Hunt & Company, 13.35 cents; Collings Manufacturing Company, 12.75 cents; Whiting Paper Company, 14 cents; Chatfield & Woods Company, 13.25 cents; and Butler Company, 14.41 cents.

For 15,700 sheets of 50% rag, 20 x 32 white index paper; M. Collins Mfg. Company, 12.95 cents; R. P. Andrews Paper Company, 18.4 cents; and Stanford Paper Company, 21.5 cents.

For 20,000 sheets of brown cloth lined paper; Middlesex Products Corp., $140.00 per M sheets; Nashua Gummed and Coated Paper Company, $124.75; Stanford Paper Company, $143.65; Barton, Duer & Koch Paper Company, $146.50; Bradner Smith & Company, $143.65; Baxter Paper Company, $145.08; Wilcox Furlong Company, $140.00; Garrett-Buchanan Company, $145.00; Mudge Paper Company; $143.65; and Whitaker Paper Company, $142.93.

For 75,000 pounds of 29 x 41 buff offset book paper; Aetna Paper Company, 8.33 cents; R. P. Andrews Paper Company, 5.93 cents; Barton, Duer & Koch Paper Company, 8.3 cents; Butler Company, 7.83 cents; Central Ohio Paper Company, 6.86 cents; Graham Paper Company, 8.78 cents; Marquette Paper Company, 6.45; Paper Corp. of U. S., 6.24 cents; Mudge Paper Company, 5.5 cents; Frank Parsons Paper Company, 6.78 cents; Stanford Paper Company, 5.68 cents; Walker Goulard Plehn Company, 7.13 cents; Whitaker Paper Company, 6.49 cents; Wilcox Furlong Walter Company, 8.5 cents; Bradner Smith & Company, 7.07 cents; North American Pulp and Paper Corporation, 7.5 cents; Bulkley Dunton & Co., 5.5 cents; Bermingham & Prosser Company, 6.95 cents; Coy Hunt & Co., 7.34 cents; and D. L. Ward Company, 7.99 cents.

Pay for Themselves in three months

That's what is expected of two Warren Stock Pumps, which in conjunction with other equipment, are being used in the recovery of rag fiber from white water at a thrifty New England mill noted for the excellence of its product. The installation represents an expenditure of approximately one thousand dollars. Three months are not yet up but it is confidently anticipated from operations to date that the entire investment will be liquidated within this period.

Perhaps you have a mill setup in which a similar saving could be made?

WARREN STEAM PUMP COMPANY, INC.
WARREN, MASSACHUSETTS

PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.

Henry J. Berger
EDITOR

Vol. 115 July 30, 1942 No. 5

COMING EVENTS IN PAPER INDUSTRY

New England Section. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

Delaware Valley Section. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

Lake States Section. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

Kalamazoo Valley Section. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

Technical Association of the Pulp and Paper Industry. Fall Meeting, Statler Hotel, Boston, Mass., September 29-October 1.

INDUSTRIAL CHANGES

Modification in more industrial plants engaged in production for civilian uses indicates the continued shift to war goods. Practically all of the larger private manufacturing concerns are now engaged in war work, most of them rating 100%. As the problem of providing war work for many of the thousands of small concerns is a difficult one, these plants are rather slowly being converted to the production of the thousand-and-one items urgently required by our armed forces. Although a large number of these smaller production units are capable of being transformed to war work, comparatively few of them have been previously engaged in precision work. For this reason, the most pressing need has, and continues to be, for experienced men in the conditioning of machine tools and production machinery, and for men who are familiar with reading blueprints in the smaller machine shops for close precision tolerances.

The machine shops in the paper and pulp industry are doing a good job, as are the shops in the textile and other major industries. The automobile manufacturers are, of course, notable examples. The General Motors Corporation, to mention but one instance, delivered in the first half of the current year, war materials 36% in excess of all shipments of war goods in the like preceding period.

While factories are turning out increasing quantities of goods and general business activity continues to expand, the *Business Bulletin*, for July, published by La Salle Extension University, states that "the effect of the war efforts on many lines of business is becoming more evident each week. More than at any time in the past, civilian industries are being compelled to make new changes, and these changes are affecting consumers much more directly than did the conversion of manufacturing facilities to war production. That conversion is largely completed and, in the future, the divergence between the production of war supplies and civilian goods will become much wider."

Commenting on the decline in consuming buying, the *Bulletin* states that, "A most striking aspect of the current situation is the decline in retail sales. Consumer buying has been slowing down for several months and is now about 20% below the high point early this year. This decline represents a much greater drop than usually takes place during these months. Several factors account for this reduction. To some extent, it is a natural reaction from the unusually high levels of consumer purchasing during the first months of the year and, also, during the last part of 1941. As a result of those two sharp buying spurts, many consumers are better stocked with goods than they normally are. Some decline can be expected after any unusual buying."

Continuing, the *Bulletin* says in part: "Another factor is the tighter credit rules which have been placed on installment and charge accounts. The reduction in retail credit volume is estimated at around $250,000,000 each month. In some lines, the reduction has been so great as to shut off buying in several important lines where formerly sales volume was large. The fears of higher prices have been somewhat less since the price-control measures have been in operation. Consumers have less reason for buying beyond their present needs if they are convinced that prices will not rise rapidly in the future. Assurances have been given that such items as shoes and clothing will not be rationed this year and, as a result of this announcement, there has been less stocking up of this type of goods. Gasoline ration has reduced shopping, particularly in many suburban centers. . . . Another factor which is much less prominent than it will be in the future, is the shortage of several types of consumer products. Reduced sales of automobiles is the most striking illustration of these shortages, but similar conditions prevail in several other lines."

In discussing the subject of the curtailment of civilian industries the *Bulletin* states that, "The downward trend is most striking in the industries making durable consumer goods. . . . The level of production is now very close to the low point which prevailed at the bottom of the depression, in 1932-1933. Production has declined 60% from the high level of last year. Further curtailment is likely, and in terms of many products, the standard of living during the next few months will be not much above the level which prevailed at the bottom of the depression. . . . In spite of the difficulties faced by civilian business, the number of business failures is still less than it was a year ago. No data are available which would indicate the number of businesses

which have ceased operating, but the number is probably quite large and will continue to be larger."

In reference to consumer incomes, the *Bulletin* points out that, "Employment is steadily expanding and now totals close to 41,000,000 persons. Approximately half this increase was in manufacturing. . . . The total national income, which represents the incomes of all persons in the country, has risen approximately 25% in the last year. If the current rate is continued, national income this year will amount to $110,000,000,000. In 1941, the national income was $92,000,000,000, and in 1929 it was $84,000,000,000. This year will mark a new record in the amount of income received by all the people."

Canada Ends Paper Salvaging

MONTREAL, Que., July 20, 1942—For some time past the salvaging of paper in Canada has been prosecuted vigorously, the newspapers helping by running a box in each issue asking the reader to save the newspaper for the local salvage committee. This practice is now being discontinued. There has been an immense over accumulation of old newsprint, so much so that an official announcement has been made by the National War Services Department of the government stating that the collection of old newsprint is now no longer necessary, "except for organizations which already have an outlet." The Ottawa Despatch announcing this decision says: "Collection of types of paper other than newsprint is still required. Success of the salvage campaigns conducted throughout Canada had eliminated all danger of a shortage in waste newspaper, Wartime Salvage Limited, government salvage company, has reported to the department."

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1942		Corresponding Weeks—1941	
June 13	88.4	June 14	99.0
June 20	86.9	June 21	99.9
June 27	84.9	June 28	101.5
July 4..(Holiday Week)	71.4	July 5	72.8
July 11	67.2	July 12	95.2
July 18.....(Preliminary)	*81.7*	July 19	100.7

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1941	85.6	89.7	92.2	96.0	98.7	99.3	94.2
1942	104.5	103.9	102.9	100.3	95.4	*87.2*	....

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1941	101.0	99.7	105.2	106.2	100.4	97.4
1942	....	....	....	....	....	....

COMPARATIVE YEARLY SUMMARIES

	1935	1936	1937	1938	1939	1940	1941	1942
Year to Date..	68.1	77.7	88.0	67.4	78.6	86.7	93.1	*96.4*
Year Average.	69.9	80.4	79.8	71.5	83.4	85.6	97.4	....

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS †

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1937	83	89	89	91	88	80	69	77	72	70	57	47	75
1938	56	63	63	60	60	59	59	69	70	73	67	61	64
1939	65	73	76	74	69	73	68	77	82	91	88	77	77
1940	78	75	74	76	82	85	77	79	78	85	82	77	78
1941	81	88	89	89	91	94	92	98	95	99	98	90	92
1942	102	101	101	95	82	72	..	..	..	..	..	..	..

Week ending June 13, 1942—72 Week ending July 4, 1942—59
Week ending June 20, 1942—69 Week ending July 11, 1942—52
Week ending June 27, 1942—72 Week ending July 18, 1942—71

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.

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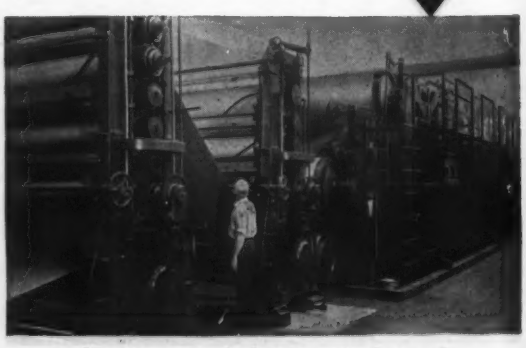

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Plasticizers	Ethocel*
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Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

Wet Tensile Breaking Strength of Paper

TAPPI Tentative Standard T 456 m-42

This method is suitable for determining the tensile strength of paper after it has been wetted with water. The results are of special interest in the testing of paper towels, blueprint and similar papers, and others which are subjected to stress after being moistened.

Depending on the use requirement, the sample may be immersed in water for a given time and tested, whether it is then completely wetted throughout or not. However, unless otherwise noted, the wet tensile breaking strength is assumed to be performed on the sample after it has been completely wetted throughout.

Apparatus

1. Tensile tester as specified in TAPPI Standard T 404 m, Tensile Breaking Strength of Paper and Paperboard. If the paper is very weak, remove the detachable weight and its pin from the pendulum and recalibrate the instrument as therein specified.

2. Apparatus for determining the water resistance of paper by the dry-indicator method as specified in TAPPI Standard T 433 m (for sized papers to be tested according to Procedure 3 after being completely wetted).

3. A supply of blotting paper. That specified in TAPPI Standard T 205 m, Forming and Testing Pulp Sheets, is suitable.

4. A 500-gram cylindrical brass weight about 40 mm. in diameter.

Test Specimen

The specimens for test shall be strips cut accurately and parallel to within 0.1 mm. and with clean edges, in each principal direction of the paper, and over 120 mm., preferably 150 mm. long. The width shall be 12.7 mm. (0.5 inch), 15.0 mm. (0.59 inch), or 15.9 mm. (0.625 inch). They shall be selected so as to be representative of the sample.

Procedure

1. For Absorbent Papers (Paper Towels, etc.)

Hold the ends of the specimen strip horizontally, allow the center portion to bend downward and partially immerse in a shallow dish of water at about 20 ± 2 deg. C. so that a length of approximately 2 inches (50 mm.) is wetted (for very absorbent papers, this distance should include that wetted by capillary action), ensuring that the water flows over at least a portion of the upper surface of the strip. Hold in this position for between two and five seconds; then withdraw the strip and touch the center against a pad of absorbent paper to remove the few drops of water adhering to it. Then without wrinkling the specimen, lay it flat and straight on a pad of blotting paper two or three sheets thick, cover with a single sheet of blotting paper and roll the 500-gram cylinder over the cover, taking about 1 second to complete the rolling. Remove the sheet of blotting paper and at once insert the strip in the jaws of the tensile tester, ensuring its proper vertical alignment; then clamp and apply the breaking load as later specified.

2. For Blueprint and Photographic Papers

Wholly immerse each strip in a tray of water having a temperature of 20 ± 2 deg. C. for 20 ± 2 minutes. Remove the excess water from each test strip by blotting, as in Procedure 1; place at once in the jaws of the tensile tester, ensuring its alignment; then clamp and apply the load as later specified.

Note: The jaws of the tensile tester may be protected from moisture by inserting small paper or felt strips between the wet specimen and the inner jaw surfaces.

3. For Miscellaneous Papers

Determine the water resistance of the sample according to TAPPI Standard T 433 m. Submerge the strips in water for a period corresponding, within 20%, to four times the time so found. If the water resistance is less than 5 seconds, immerse the center portion only for the calculated time and follow the procedure described in Procedure 1. If the water resistance is greater than 5 seconds, immerse the entire strip in water for the calculated time and follow Procedure 2.

Note: The reason for not submerging the entire strip in the case of very absorbent papers, is that in general they are very weak and unless the ends are dry, the strip is difficult to handle and it is especially difficult to secure proper alignment when it is placed in the jaws of the tensile tester.

Apply the tensile load and complete the test in accordance with the procedure given in TAPPI Standard T 404 m.

Report

Results obtained on strips cut in the machine direction shall be reported as wet tensile strength, machine direction, and the results obtained on strips cut in the cross direction shall be reported as wet tensile strength, cross direction. The average value of the breaking load results shall be reported in kilograms per 15 mm. width, or pounds per inch width, to the nearest 2% of the total reading. (Kg. per 15 mm. ×

3.73 = lb. per inch.) The average, maximum and minimum wet tensile strength for each of the principal directions of the paper shall be reported. Except for absorbent papers tested according to Procedure 1, report also the time of immersion.

Additional Information

1. For lightweight, very weak, absorbent tissues it may be found necessary to defer wetting until the strips are placed in position in the jaws of the tensile tester. In such case a very soft flat brush should be used for wetting them, the water being applied with vertical strokes for a depth of about 2 inches, taking care to wet a uniformly wide band across the test strip.

An attachment for holding and also wetting the samples as described by Finch *(1)* is also especially suitable for such very weak papers. In using this apparatus, which is held in position by the lower jaw of the tensile tester, the dry strip is looped around a horizontal bar and the two free ends are clamped together in the upper jaw of the tensile tester. A small cup containing water is slid up to submerse the bar and the looped end of the specimen. The cup is then dropped and the test made in the usual way. The tensile load as found is divided by two to give the approximate strength of a single strip.

2. In general, the longer the wetted portion of the strip under test, the more uniform are the results. The average is then also slightly lower.

3. There is some evidence to indicate that with certain absorbent papers the presence of drops of free water on the strip undergoing test reduces the test result slightly.

Literature Cited

1. *Bell Lab. Record* 19:309 (1941).

REPRINT NOTE: Reprints of TAPPI Tentative Standard T 456 m-42 may be obtained from the Technical Association of the Pulp and Paper Industry, 122 East 42d Street, New York, New York, at 25 cents each.

Casein in New Trade Agreement

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., July 29, 1942—The new trade agreement between the United States and Uruguay made last week provides for a 30 per cent reduction in import duties on certain hygienic paper in rolls, squares or other forms the State Department said in its announcement of the agreement. Exports to Uruguay of these items amounted to $5,000 in 1940.

Dealing with the importation of casein into the United States from Uruguay the State Department says:

The duty on casein or lactarene under the Tariff Act of 1930 was 5½ cents per pound. Under the act of 1922 it was 2½ cents per pound. Under the trade agreement with Uruguay, as in that with Argentina which became effective November 15, 1941, the duty is reduced to 2¾ cents per pound. The ad valorem equivalent of the 5½-cent rate has ranged in recent years from about 80 per cent to about 110 per cent. On the basis of imports in 1939 the reduced rate of 2¾ cents per pound would have been equal to about 49 per cent ad valorem.

The volume of United States casein production is determined in part by the price of casein but more largely by total production of whole milk and the proportions of that production marketed as fluid milk and used in the manufacture of creamery butter, cheese, and condensed and evaporated milk. Casein is a by-product of the skim milk derived from the manufacture of creamery butter and normally the greater portion of this skim milk is used in feeding livestock rather than in producing casein. Moreover, when a larger proportion of total milk production is diverted from manufacture of butter into the manufacture of cheese and of dried and condensed milk, the quantity of skim milk available for manufacture of casein is reduced.

In the period of 1931-1940 imports of casein into the United States ranged from 417,000 pounds in 1938 to 24,523,000 pounds in 1940, with an annual average of 8 million pounds for the period. These imports accounted for less than 1 per cent of consumption in 1938 and for about 33 per cent in 1940. Uruguay was second to Argentina in 1940 and in the first 6 months of 1941 as a supplier of casein imports into the United States.

In the period 1929-1940 the average price per pound of 20-30 mesh domestic casein (f.o.b. plant in 5-ton lots) decreased from 15.4 cents in 1929 to 6.2 cents in 1932, and then increased to 16.5 cents in 1936, the peak year of the period. The price was 19.8 cents on May 16, 1941, and 20.8 cents as of May 15, 1942.

Flow or Liquid Level Manometer

The absence of mercury or other liquid from this latest development of the Taylor Instrument Companies removes the possibility of product contamination and the hazard of mercury being blown due to line surges or carelessness. Further advantages are that sealing liquids are rarely required and vital mercury is released for the war effort.

Replacing the stuffing box is a new torque tube assembly which gives a completely closed system and is designed so as to eliminate friction and lubrication. This new assembly also does away with the lost time involved in maintenance. Friction, lost motion and wear are further reduced by the absence of internal pivots and springs.

Metal bellows respond to the pressure variations and insure faster response under ordinary circumstances with immediate reaction to sudden changes in flow. The sturdy bellows are built to withstand high over-range without damage.

Under steady flow conditions the Taylor Aneroid Manometer is accurate within 1% of scale range. It is available for all types of indicating and recording meters and controllers and is supplied for standard ranges between 20 and 500 inches of water. The range can be changed right on the job by substituting precalibrated torque tubes.

Additional information may be obtained from the Taylor Instrument Companies, Rochester, N. Y.

Flow of Sulphite Pulp Slurries Over Weirs*

By Roy P. Whitney[1] and James D. McNitt[2]

Abstract

Data are presented on the flow of beaten and unbeaten spruce sulphite pulp slurries over 4-, 6-, 9-, and 12-inch rectangular weirs. In general, increasing the consistency of the slurry results in a decreased flow; this effect is more pronounced with the freer stocks.

Plant work and test problems, involving such considerations as the operating characteristics of screens, thickeners, bleachers, and the like, have demonstrated the desirability of measuring the rate of flow of pulp slurries directly by means of weirs. Such slurries have flow characteristics which may differ considerably from water, and consequently the usual weir formulas are not always applicable.

Although considerable work has been carried out in determining the pressure drop attendant to the pumping of pulp slurries through pipes, no data are available from which the flow of the slurries over weirs may be predicted. Consequently, the investigation described below was carried out, in order to determine the flow characteristics of beaten and unbeaten spruce sulphite stock of freeness 400 and 650 cc., respectively, over 4-, 6-, 9-, and 12-inch rectangular sharp-edged weirs.

Apparatus and Procedure

The apparatus used consisted essentially of a rectangular weir box, 51 by 29 by 23 inches deep, located about 10 feet above a wooden sump tank. A sulphite pulp slurry of the desired consistency was prepared in the sump and circulated up through the weir box by means of a stock pump. Through the use of a hinged flume, the slurry discharging over the weir could be returned directly to the sump, or could be diverted to a calibrated tank for rate measurement.

The rectangular weirs were cut from 22-gage galvanized iron, and were inserted in the end of the weir box in such a manner as to present a smooth surface upstream. The base of the weir was 7 inches from the bottom of the box.

The head of the slurry in the weir box was measured with a hook gage placed 1 foot upstream from the weir plate. The measuring point was taken as the liquid (water) level and not the highest point which might be some protruding bundle of pulp. The rate of flow was measured by timing the rise of the stock in the calibrated tank after diverting the flow directly from the weir to the tank.

Consistency measurements were made in accordance with TAPPI Standard procedures and are reported as percentage of moisture-free pulp in pulp and water. Freeness tests were run on a Canadian standard freeness tester and are reported in cubic centimeters. Both consistency and freeness tests were carried out at frequent intervals, in order to detect any changes which might have taken place.

TABLE I.—SUMMARIZED DATA

Head in feet		0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45
Freeness, cc.	Consistency, %	Flow in gallons per minute									
		12-inch Weir									
400	0	0	16	48	86	133	186	...	...	...	...
	1.0	..	..	43	86	133	186	...	...	...	...
	1.5	..	..	36	82	133	186	...	...	...	...
	2.0	..	..	22	72	127	186	...	...	...	...
	2.5	..	..	..	55	116	178	...	...	...	...
	3.0	..	..	..	17	81	146	213	...	...	...
	3.5	..	..	..	..	25	92	159	226	...	...
650	0	0	16	48	86	133	186	...	...	...	...
	1.0	..	..	42	84	136	197	...	...	...	...
	1.5	..	..	28	76	133	197	...	...	...	...
	2.0	..	..	..	52	111	181	...	...	...	...
	2.5	..	..	..	..	52	141	231	...	...	...
		9-inch Weir									
400	0	0	13	36	64	99	139	184	...	...	...
	1.0	..	..	31	60	96	137	184	...	...	...
	1.5	..	..	25	56	93	135	182	...	...	...
	2.0	..	..	..	47	85	127	175	226	...	...
	2.5	..	..	..	28	67	111	158	208	...	...
	3.0	..	..	..	..	35	79	128	181	...	...
650	0	0	13	36	64	99	139	184	...	...	...
	1.0	..	..	28	60	96	137	185	...	...	...
	1.5	..	..	..	50	89	133	182	...	...	...
	2.0	..	..	..	31	71	115	167	224	...	...
	2.5	..	..	..	..	37	83	136	197	...	...
	3.0	..	..	..	..	..	20	79	143	...	...
		6-inch Weir									
400	0	0	10	25	44	66	93	122	154	189	...
	1.0	..	..	25	44	66	93	122	154	189	...
	1.5	..	..	..	39	62	89	119	153	189	226
	2.0	..	..	..	30	54	82	113	146	183	225
	2.5	..	..	..	..	39	68	100	134	172	217
	3.0	..	..	..	..	..	48	81	117	155	198
	3.5	..	..	..	..	..	..	52	92	132	176
650	0	0	10	25	44	66	93	122	154	189	224
	1.0	..	..	23	42	64	91	121	153	188	224
	1.5	..	..	..	35	59	86	117	150	186	224
	2.0	..	..	..	21	47	76	107	142	179	217
	2.5	..	..	..	..	20	52	88	124	161	199
	3.0	..	..	..	..	..	..	44	86	129	172
		4-inch Weir									
400	0	0	6	16	30	45	63	82	103	126	150
	1.0	..	..	..	26	42	61	81	103	126	150
	2.0	..	..	..	21	37	55	76	98	122	148
	2.5	..	..	..	16	31	49	68	90	113	138
	3.0	..	..	..	..	18	37	57	79	102	126
	3.5	..	..	..	..		16	37	60	84	109
650	0	0	6	16	30	45	63	82	103	126	150
	1.0	..	..	..	30	45	63	82	103	126	150
	1.5	..	..	..	22	38	55	74	94	118	144
	2.0	..	..	..	13	28	45	64	85	108	134
	2.5	..	..	..	..	13	29	46	66	88	114

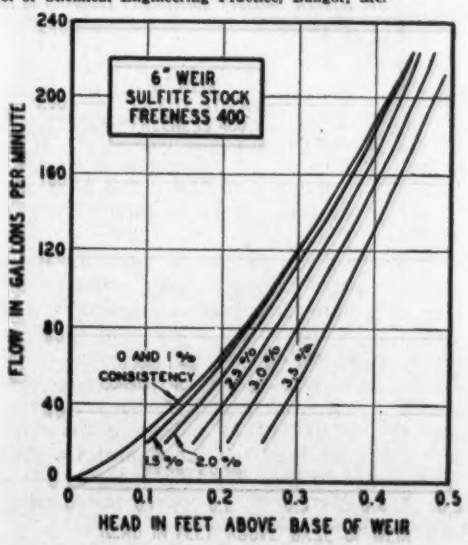

FIG. 1
Flow of Beaten Sulphite Stock over a 6-Inch Rectangular Weir

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 16-19, 1942.

[1] Member TAPPI; Director of the Bangor Station, M.I.T. School of Chemical Engineering Practice, Bangor, Me.
[2] Member TAPPI; Asst. Director of the Bangor Station, M.I.T. School of Chemical Engineering Practice, Bangor, Me.

Results and Discussion

The results of the tests are presented in Table I, for 4-, 6-, 9-, and 12-inch rectangular weirs, using sulphite slurries of freeness 400 and 650 cc., respectively. These two freeness values were chosen to represent a beaten (400 cc.) and an unbeaten (650 cc.) stock. The results are shown in Figs. 1 to 4, for the 6- and 12-inch weirs and for both freenesses. Inspection of the figures shows that the flow of the pulp slurries may deviate widely from the flow of water. For example, for the 6-inch weir and the 400 cc. freeness stock (Fig. 1), at a head of 0.3 feet, the flow for a 3.5% slurry is only 43% of the flow for water.

In general, it can be said that, at constant head, an increase in pulp consistency results in a decreased flow. Some contradiction of this rule is noted at high heads, however, where flows of slurry greater than the corresponding water flows were observed. This is particularly apparent in the case of the 9- and 12-inch weirs (*see* Fig. 3). No explanation for this fact is offered, but it should be noted that the condition was reproduced sufficiently to place the phenomenon outside the realm of experimental error.

As might be expected, the difficulties encountered in obtaining reproducible data were much greater at the high consistencies. Consequently, the values at the high consistencies are believed to be less accurate. For water, the data for all weir sizes agree very closely with the Francis equation for suppressed weirs. On that basis, for consistencies up to 1.5%, the data are believed to be accurate to 5%. At higher consistencies, the accuracy probably becomes progressively poorer, and for 3 and 3.5% slurries, the values may be as much as 15% in error.

It has been pointed out that data were obtained at the two freenesses of 400 and 650 cc., respectively. Where variations from these bases occurred, the data were corrected to the standard freenesses by graphical interpolation. It is apparent from a study of the curves that the change in freeness reflects a considerable change in the flow characteristics of the slurries, with the more free stock (650 cc.) deviating more widely from the water line. Therefore, in using weirs

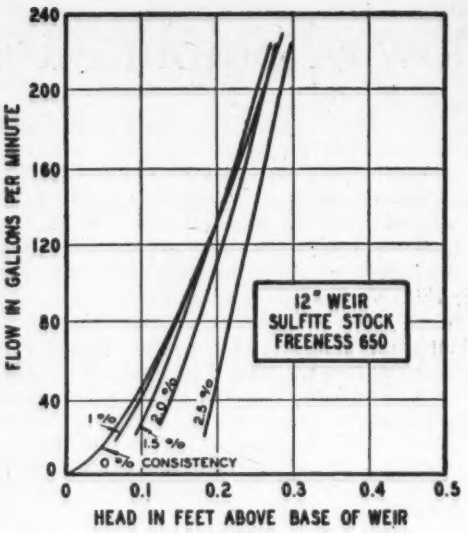

FIG. 3
Flow of Beaten Sulphite Stock over a 12-Inch Rectangular Weir

to measure flow rates at consistencies above 1.0%, it is recommended that the freeness be taken into consideration, at least to the extent of differentiation between beaten and unbeaten stock.

It should be noted that, for low consistencies, the flow can be calculated satisfactorily from the Francis formula:

$$Q = 1495\ L\ H^{3/2}$$

where

Q = gallons per minute
L = width of the rectangular sharp-edged weir in feet
H = head of slurry above the base of the weir in feet

In general, this procedure is justified up to a consistency of 1% for the 650 cc. freeness, and up to 1.5% for the 400 cc. freeness.

It is obviously desirable to have available data such as have been presented in this paper for other weir sizes, particularly sizes larger than 12 inches. For this purpose, some correlation which would present all of the data in graphical or algebraic form would

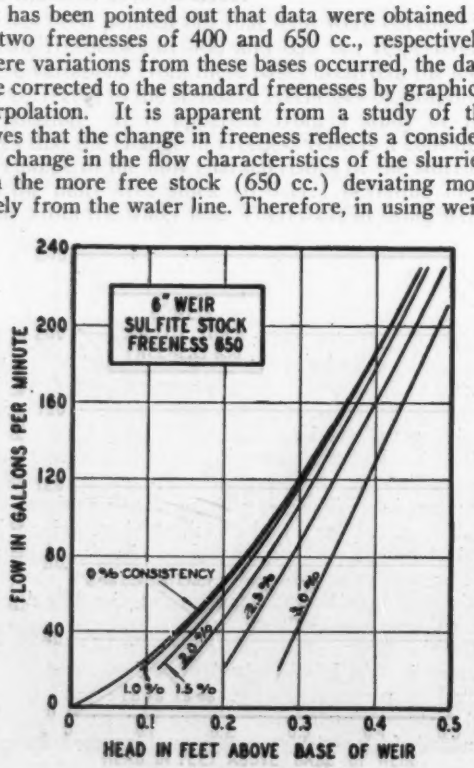

FIG. 2
Flow of Unbeaten Sulphite Stock over a 6-Inch Rectangular Weir

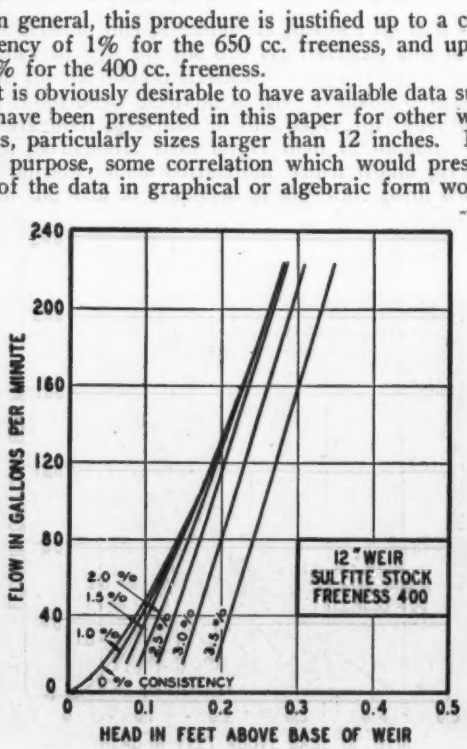

FIG. 4
Flow of Unbeaten Sulphite Stock over a 12-Inch Rectangular Weir

be desirable. Such a correlation is possible, but in order to evaluate the effect of all of the pertinent factors it becomes extremely complex and its general use is not considered to be feasible.

By analogy to the flow of water over weirs, it might be expected that the quantity of slurry discharged should be directly proportional to the width of the weir, *L*. It can be seen that such is not the case, particularly with the smaller weirs. A study of the data indicates that the proportionality of flow to width is more closely approached as the weir width is increased, however, and it is believed that it can be taken to hold at widths of 12 inches or greater. Consequently, in the absence of further data, it is recommended that for weirs greater than 12 inches in width, the flow be taken from the 12-inch weir data, corrected by the direct ratio of the weir widths.

Acknowledgment

The authors wish to acknowledge the efforts of students in the School of Chemical Engineering Practice of the Massachusetts Institute of Technology (M.I.T.), who obtained the data from which the results presented in this paper were calculated.

Control of Direct-Heated Sulphite Digesters*

By John F. Inderdohnen[1]

Abstract

Installation photographs are presented, with brief explanatory notes, giving data on a completely automatic control system for sulphite pulp digestion.

A set of chart records illustrate the functioning of the control system covering circulating liquor and digester temperatures, current in the circulating pump circuit, pressure in the digester, and steam flow to the digester.

Attention is drawn to the possibility of uniform quality pulping in sulphite digesters with circulating systems wherein the cooking liquor is directly heated by steam.

Introduction

In an earlier paper (A Time-Temperature Control for Sulphite Digesters, presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Feb. 19-22, 1940) we dealt with a resistance thermometer potentiometer time-temperature control applicable to sulphite digesters with circulating systems for the liquor.

Since that time considerable experience has accumulated with actual operating installations which justify such control systems. The present paper will deal with installation data and operating results based largely on experience at the Great Lakes Paper Company sulphite mill at Fort William, Ontario.

Central Control Panel

Figure 1 gives a view of the central control panel on the operating floor. At the right hand end the top two instruments are the complete time temperature controller, using a potentiometer resistance thermometer measuring system and the reset air-operated control mechanism.

Below, is a two-pen recording vapor tension thermometer for checking top and bottom digester temperatures in the usual way. To the left of this recorder is the time-pressure relief controller which operates the synchro diaphragm relief valve shown in the foreground. The third instrument on the upper panel records the current in the circulating pump circuit—a standard recording ammeter. Below this is

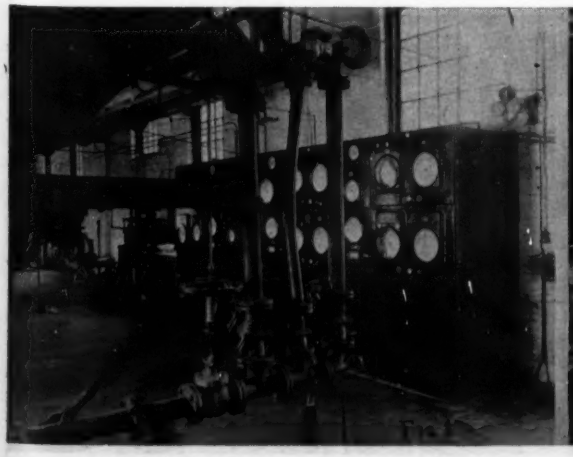

FIG. 1

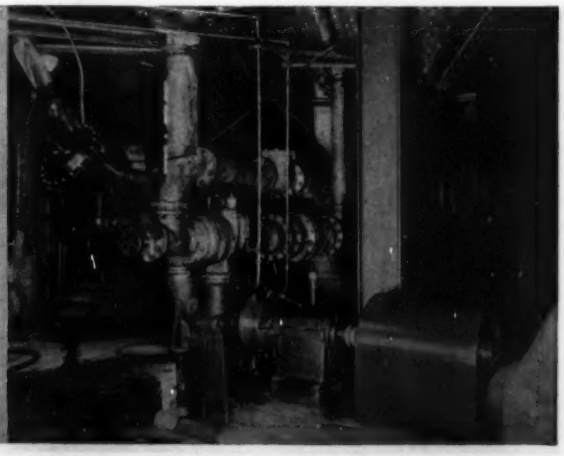

FIG. 2

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Hotel Commodore, New York, N. Y., Feb. 16-19, 1942.

[1] Engineer, The Bristol Company, Waterbury, Conn.

a steam flow recorder. The steam flow to the digester is recorded, and a pressure pen on the same chart shows the control results of the digester relief controller.

Figure 2 shows the hydroheater and circulating pump. The heater mixes steam and liquor to maintain a prescribed liquor temperature to the digester.

The synchro-air motor on the hydroheater positions the heater plug based on the time-temperature controller action. The resistance thermometer bulb head

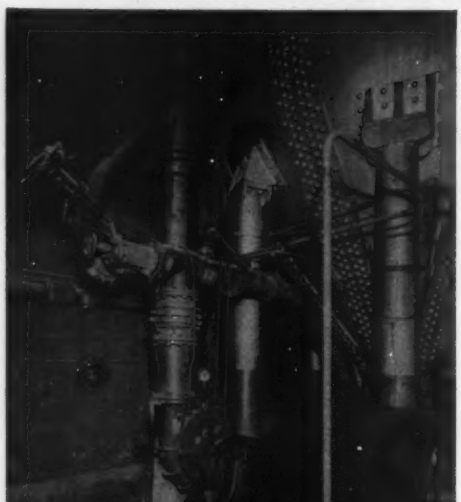

FIG. 3a

and wires are shown at the outlet of the heater. The handwheel is provided for hand positioning of the heater plug. The synchro-air motor is mounted at an angle to give greater clearance from the floor for passageway and also to reduce the total extended length from the heater. It can be rotated to the right or left or below the heater at the same angle if desired.

Figure 3 shows another hydroheater and synchro-air motor on another digester.

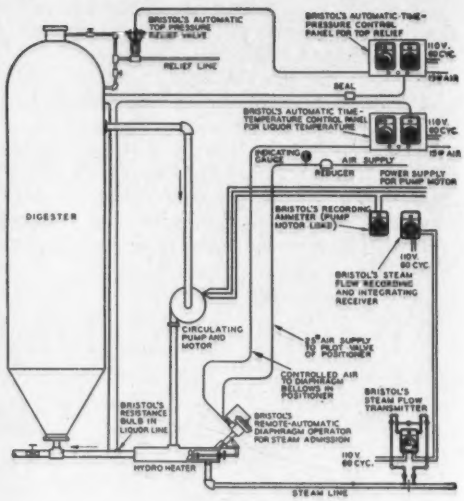
BRISTOL'S AUTOMATIC TOP PRESSURE RELIEF VALVE
RELIEF LINE
BRISTOL'S AUTOMATIC TIME-PRESSURE CONTROL PANEL FOR TOP RELIEF
110 V. 60 CYC.
SEAL
BRISTOL'S AUTOMATIC TIME-TEMPERATURE CONTROL PANEL FOR LIQUOR TEMPERATURE
INDICATING GAUGE
AIR SUPPLY
REDUCER
POWER SUPPLY FOR PUMP MOTOR
DIGESTER
BRISTOL'S RECORDING AMMETER (PUMP MOTOR LOAD)
BRISTOL'S STEAM FLOW RECORDING AND INTEGRATING RECEIVER
CIRCULATING PUMP AND MOTOR
AIR SUPPLY TO PILOT VALVE OF POSITIONER
CONTROLLED AIR TO DIAPHRAGM BELLOWS IN POSITIONER
BRISTOL'S RESISTANCE BULB IN LIQUOR LINE
BRISTOL'S REMOTE-AUTOMATIC DIAPHRAGM OPERATOR FOR STEAM ADMISSION
BRISTOL'S STEAM FLOW TRANSMITTER
HYDRO HEATER
STEAM LINE

FIG. 5

Figure 4 is a view of the cook floor with the chip distributor in operation. It also shows a synchro-air motor relief valve and its relation to the manual side and top relief valves.

Figure 5 diagramatically illustrates the installations and the relations and functions of the equipment involved in a complete direct heated circulating system for sulphite digesters.

Operating Results

The operating results of such control systems are shown by the series of chart records from the recorders used on this installation.

Figure 6 is a record made by the Pyromaster resistance thermometer time-temperature reset air controller actuating the valve positioner and synchro-air motor on the hydroheater. The controller cam duplicates the chart itself on a metal disk. It is cut to the control curve desired, and has adjustments for slightly altering the settings without cutting new cams.

The temperature in this case was smoothly brought up to 130 deg. C. in six and one quarter hours, held one and a quarter hours, and then the steam supply to the digester was shut off manually. This is apparent from the record.

FIG. 3

FIG. 4

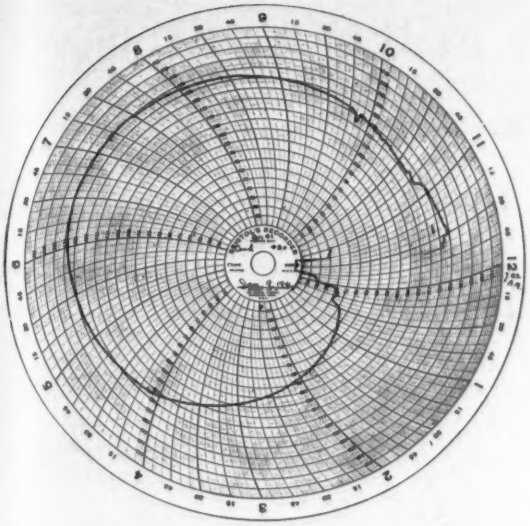

FIG. 6

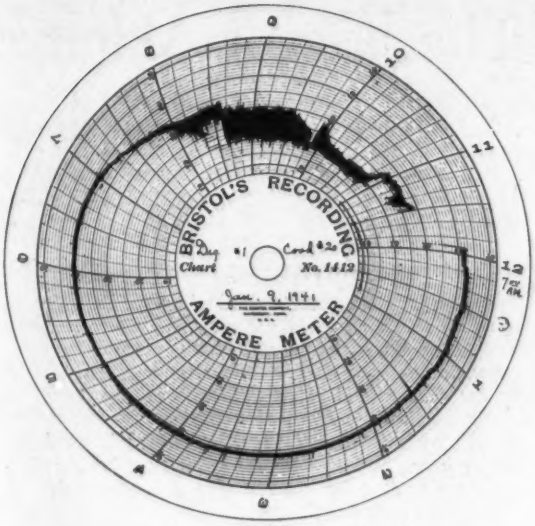

FIG. 7

Figure 7, the ammeter chart, notes a falling off of power in the pump circuit after seven and a half hours operation. This indicates enough pulping in the collector ring to cause the pump to draw the liquor through in slugs. Just before eight hours of operation the chart indicates this slugging of liquor has become rapid enough to upset further temperature controller action based on the bulb in the circulated liquor line.

Incidentally, a switchover could be made, either manually or automatically to another resistance bulb or other electric temperature sensing element placed directly in the digester if such a feature were desired.

Figure 8 shows how good chip distribution and circulation give uniform temperatures in different parts of the digester. These records are of the top and bottom temperatures of the digester. Notice how these record lines stay together during the heating up period to 113 deg. C. and then follow uniformly within a few degrees of each other.

Figure 9 shows the control of digester pressures effected by the time-pressure ampliset free vane air-operated controller and the synchro-air motor valve in the relief line. The valve body is of KA2SMo, double-seated, with a ratio plug to give graduated action.

The time-pressure cam is cut to give the desired control curve and the chart record (Fig. 9) shows how well the pressure curve was maintained.

Incidentally, checking the steam flow curve on this chart against the temperature curves on charts Figs. 6 and 8 indicates in reverse the difficulty involved in maintaining a correct digester temperature curve based on automatic control of steam to the digester. This flow curve is quite variable, yet the temperature curves are uniformly those required.

Conclusion

Sulphite pulp digestion is essentially a chemical process. Given close control of temperature and pressure factors and a good control over the chip distribution in loading the digester and of acid strength, uniform quality pulping is attainable.

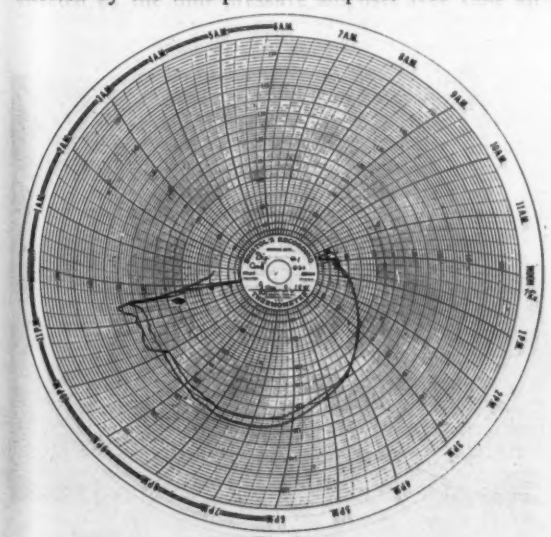

FIG. 8

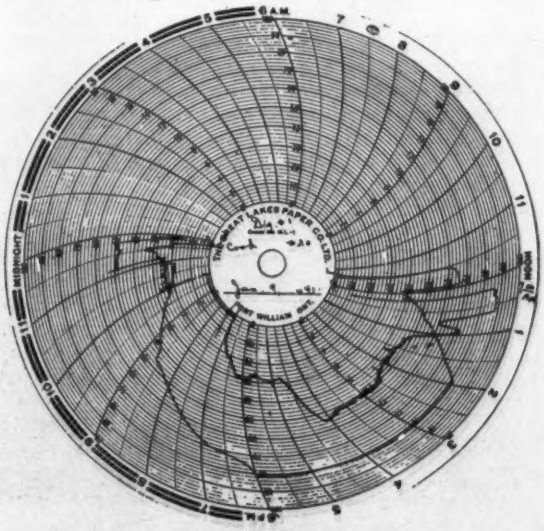

FIG. 9

The Use of Aldehydes in the Analysis of Sulphate Liquors for Total Alkali*

By D. Romund Moltzau[1]

Abstract

The presence of certain aldehydes has been found to prevent the reaction between sulphide and sulphite which takes place at lower pH values when alkaline solutions containing these constituents are neutralized. The use of furfural in particular has been found to provide a generally applicable method for the determination of total alkali in such materials as kraft white or green liquors by acidimetric titration employing potentiometric or colorimetric indicator methods of end point detection.

The effects accompanying the presence, respectively, of formaldehyde, acetaldehyde, and furfural in the acidimetric titration of alkaline solutions of sodium sulphide, sodium sulphite, sodium thiosulphate, and mixtures thereof, have been studied potentiometrically and also conductometrically. Characteristics peculiar to the particular system involved are illustrated by the resulting titration curves. The potentiometric data indicate a striking influence exerted by aldehydes, especially formaldehyde, on the behavior of sodium sulphite, sodium sulphide, and sodium thiosulphate as regards their alkaline properties.

Interactions arising from the simultaneous presence of sulphide and sulphite apparently do not invalidate the conductometric method and thus the use of aldehydes in such cases is of no advantage. Applied to kraft black liquor, the conductometric method appears to provide a reliable method for the determination of total alkali which may be made the basis for an accurate estimation of the sodium compounds ultimately recoverable as active alkali.

In the acidimetric titration to the methyl orange end point of alkaline solutions containing both sodium sulphide and sodium sulphite, results tend to be erroneously low due to a reaction between the two constituents which results in the formation of free sulphur and a decrease in alkalinity. The extent of such interference is not quantitatively predictable from the amounts of sulphide and sulphite present, since the reaction proceeds apace with the addition of acid and is probably influenced by the particular experimental conditions incidentally attaining to any given titration. No stoichiometric relationships are apparent.

The presence of certain aldehydes in the titration mixture has been found to prevent such interference, allowing quantitative results to be obtained in an acidimetric titration of a mixture of the two constituents. Other effects peculiar to the particular aldehyde employed have been observed relative to the behavior of sulphide, sulphite, and thiosulphate on addition of acid. Formaldehyde causes sodium sulphide to titrate potentiometrically as a strong divalent base, sodium sulphite as a strong monovalent base, and sodium thiosulphate as a very weak monovalent base which is only about 70% neutralized at a pH of 4. Acetaldehyde and furfural tend qualitatively to behave similarly, although the complexes involved are apparently less stable than in the case of formaldehyde and lead to considerably different quantitative results. In the presence of either of these aldehydes the titration of sodium sulphide with acid yields a titration curve which is similar to that obtained in the case of a pure water solution of the salt, except that the break corresponding to the bisulphide end point is shifted partially toward complete neutralization. The behavior of sodium thiosulphate on addition of acid is not materially affected by the presence of either acetaldehyde or furfural. The presence of aldehydes has no effect on the titration of hydroxide and carbonate.

With reference to the analysis of sulphate white and green liquors for total alkali as usually accomplished by acidimetric titration to the methyl orange end point, the effects noted assume an immediate pertinency. Such liquors normally contain, in addition to hydroxide, carbonate, sulphate, and sulphide, certain amounts of sulphite and thiosulphate. Since the latter constituents are usually present in rather minor quantities, interferences due to their presence are correspondingly small but nevertheless constitute a source of error and uncertainty in the determination as usually conducted. Such error will be reflected in magnified proportion in the estimation of sodium carbonate when derived from the difference in titration before and after treatment with barium chloride which removes the interfering sulphite as well as the carbonate. The use of furfural in the titration for total alkali according to the otherwise normal procedure provides a generally applicable method regardless of the sulphite content of the liquor, and effectively eliminates inaccuracies and uncertainties otherwise occurring.

When mixtures of sodium sulphide and sodium sulphite are titrated acidimetrically employing conductometric methods of end point detection, no controversion of results occurs as when potentiometric or colorimetric (indicator) methods are employed. The final end point conductometrically determined represents quantitatively the complete neutralization of the sulphide and conversion of the sulphite to bisulphite either in the presence or absence of aldehydes. Sodium thiosulphate, however, in the presence of formaldehyde, titrates conductometrically with acid to give an end point representing approximately one equivalent per mole of thiosulphate. The form of the conductometric titration graphs preceding the final acid line are in general fundamentally affected by the presence of aldehydes, especially by formaldehyde. Applied to sulphate black liquor without addition of aldehydes, the conductometric method appears to yield a valid and reliable result for total alkali representing all of the hydroxide, carbonate, sul-

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Hotel Commodore, New York, N. Y., Feb. 16-19, 1942.

[1] Research Assistant, The Institute of Paper Chemistry, Appleton, Wisconsin.

phide and sodium organic compounds, one half of the sodium sulphite, but none of the sodium thiosulphate.

Procedure

Approximately molar solutions (2 *M* in the case of sodium hydroxide) of each of the compounds involved in the investigation were made up with recently boiled distilled water from preparations of the highest purity commercially available. These were reserved as stock solutions and used throughout the work. The exact compositions or effective strengths of the solutions as determined by the acidimetric titrations involved in the investigation were checked in the case of the sulphide, sulphite, and thiosulphate solutions by iodometric methods.

Although different phases of the investigation were conducted at rather widely separated intervals, the composition of the respective solutions (except in the case of sodium sulphite) remained quite constant. During the six months over which the solutions were used, the Na_2SO_3 content of the sulphite solution fell off about 25% due to oxidation to sulphate. The sodium sulphide solution remained much the same over this period, less than 5% being converted to sodium thiosulphate, even though no special precautions were taken to protect it from the atmosphere.

Because air oxidation and absorption of carbon dioxide were factors requiring consideration in handling the solutions, an effort was made to perform all manipulations in a comparable manner and to carry out the titrations as quickly as possible after removal of the samples from the stock solutions. With reasonable care in this respect such factors did not interfere to any detectable extent in the case of potentiometric titrations with the attainment of concordant results. In the case of the conductometric titrations, however, the amount of material involved being smaller, the dilutions greater, and the stirring more vigorous, the results indicated the occurrence of air oxidation to a considerable extent.

In the case of the general procedure followed in the potentiometric titrations, an accurately measured volume (usually 5 cc.) of the stock solution of each constituent involved in the experiment was removed directly to the titration vessel containing such a volume of water that the total volume at the outset of the titration was approximately 100 cc. In those experiments where aldehyde was present, 5 cc. of the pure liquid acetaldehyde or furfural or of the 40% formaldehyde solution were employed. This amount represented a large excess over that actually required for effective action. The solutions thus prepared were titrated potentiometrically, using a glass electrode,

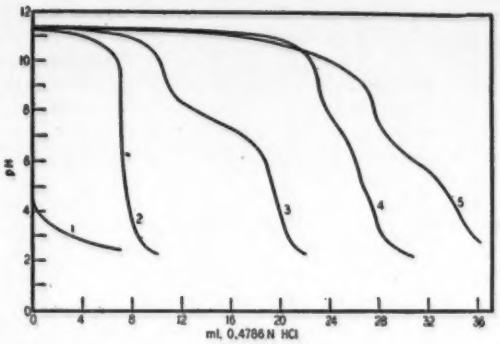

FIG. 2
Titrations in the Presence of Acetaldehyde

with standard 0.5 *N* hydrochloric acid. After each addition of acid the solution was briefly stirred by hand with a glass rod before the pH reading was made. In some of the titrations a few drops of methyl orange indicator solution were added in order to correlate the color change of that indicator in the system under investigation with the potentiometric data. Based on the data, titration curves were obtained by plotting pH values as ordinates against the volume of acid added. Such curves, showing the effect of the presence of furfural, acetaldehyde, and formaldehyde, are presented in Figs. 1, 2, and 3.

For the conductometric titrations an apparatus similar to that described by McElhinney, Whittemore, and Lynch *(1)* was used. Ten-fold dilutions of the stock solutions were accurately made and proper aliquots of the diluted solutions transferred to a 250 cc. beaker, which served as a titration vessel, containing such a volume of water that the final volume before starting the titration was 170 cc. All dilutions were made with recently boiled and cooled distilled water. The standard acid used was 0.1 *N* sulphuric and this was added in increments of 1 cc., readings in a given titration being taken after each addition of acid at a constant potential across the electrodes on a 25-ma. ammeter. In cases where aldehydes were present, 5 cc. portions of the commercial preparations were employed per titration. The ammeter readings were plotted as ordinates against the volume of acid added. The resulting graphs are shown in Figs. 4 and 5.

Discussion of Results

In Fig. 1, Curves 1 and 2 represent the titration of sodium thiosulphate corresponding to 5cc. of the molar stock solution, respectively, in the absence and

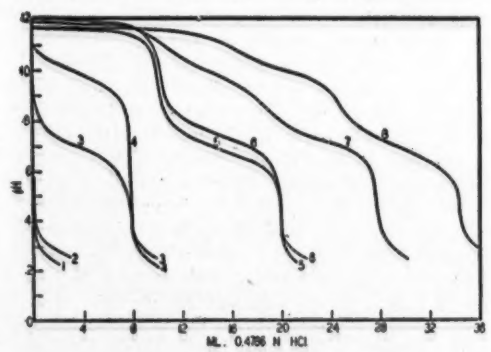

FIG. 1
Titrations in the Presence of Furfural

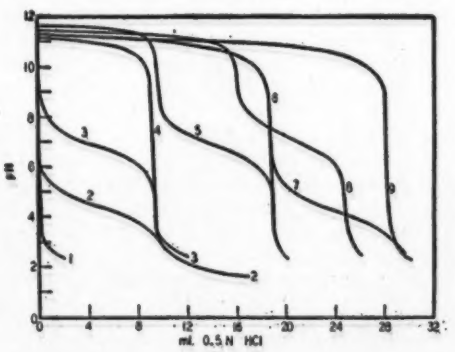

FIG. 3
Titrations in the Presence of Formaldehyde

presence of furfural. In either case no appreciable quantity of acid is required to reach a pH of 4. Curves 3 and 4 represent similar titrations in the case of sodium sulphite. The Na_2SO_3 content of the stock solution at the time these titrations were made was found to be 0.77 *M* by both iodometric and acidimetric methods. It will be noted that identical results are obtained by titration to a pH of 4 in the presence or absence of furfural. The course of the titration before neutralization to bisulphite is achieved, is radically altered by the presence of the aldehyde (Curve 4), elevated pH values being maintained until the bisulphite end point is virtually reached. Curves 5 and 6 show the course of pH change on titration, respectively, in the absence and presence of furfural of an amount of sodium sulphide corresponding to 5 cc. of the approximately molar stock solution. Again it will be noted that identical results are obtained in the two cases by titration to a pH in the neighborhood of 4. The course of the titration preceding complete neutralization is not greatly affected by the presence of furfural, although somewhat higher pH values are obtained for any given percentage neutralization and the first break in the curve is appreciably shifted toward the right. Curve 7 represents the titration in the presence of furfural of a mixture of sodium sulphide and sodium sulphite corresponding to 5 cc. of each of the stock solutions. The titration to a pH of 4 is quite precisely the calculated value derived from titrations represented by Curves 3 and 5, being only about 0.3% low (which may be regarded as within the experimental error). Curve 8 represents the titration of a mixture qualitatively resembling the composition of a sulphate white liquor but modified in a quantitative sense in that much larger proportions of sulphite and thiosulphate were included. The solution titrated corresponded to 2.5 cc. each of the NaOH, Na_2CO_3, Na_2S, Na_2SO_3, and $Na_2S_2O_3$ stock solutions. From the known compositions of these solutions it was calculated that, to completely neutralize the hydroxide, carbonate, and sulphide and to convert the sulphite to bisulphite, a titration of 34.7 cc. would be required. The actual titration to a pH of 4, corresponding to the methyl orange end point, was 34.5 cc., representing an error of about 0.6%. Considering the number of volume measurements involved and the instability of the solutions, this is perhaps well within the experimental error and affords no indication that the titration in the presence of furfural is not theoretically exact. Although a rather heavy white turbidity is formed at lower pH values when solutions containing sulphide are titrated in the presence of furfural, the sharpness of the methyl orange color change is not impaired under these conditions. Though not a serious objection to the method, a somewhat disagreeable odor accompanies the use of furfural in such titrations.

In Fig. 2 are shown the curves potentiometrically obtained for a series of acidimetric titrations in the presence of acetaldehyde of solutions whose compositions were the same, respectively, as the five described in connection with Fig. 1. The forms of the curves, in general, bear a certain resemblance to those obtained in the case of furfural but in all cases the pH drop in the neighborhood of a value of 4 is less sharp . This disadvantage, together with the very objectionable odor accompanying the use of acetaldehyde and its high volatility, presents an unfavorable comparison with furfural as regards the use in question. The results obtained by potentiometric titration to a pH of 4 were practically identical with those obtained with furfural except that, as shown by Curve 1, a larger, but still small, amount of acid was required in the case of sodium thiosulphate. The pH values obtained at any given percentage neutralization prior to immediate approach to the bisulphite equivalence point (Curve 2) were even higher than in the corresponding titration of sodium sulphite in the presence of furfural. As shown by Curve 3, the same effect occurred in the titration of sodium sulphide and the position of the first break in the curve is shifted still further toward complete neutralization. These effects are reflected in the form of Curve 4, representing the titration of a mixture of sodium sulphide and sodium sulphite, except that the interval between the first break in the curve and the value at a pH of 4 was abnormally shortened. The titration volume corresponding to a pH of 4 in this titration, as well as in that represented by Curve 5, agreed quite closely with the calculated values, showing that the presence of acetaldehyde quite effectively prevents interference arising from the interactions of sulphide and sulphite or their neutralization products.

The curves of Fig. 3 show the effect of the presence of formaldehyde on the acidimetric titration, respectively, of sodium thiosulphate, sodium sulphite, sodium sulphide and mixtures thereof. Curves 1, 3, 5, and 8 represent the titrations without aldehyde present, respectively, of sodium thiosulphate, sodium sulphite, sodium sulphide, sodium sulphide plus sodium thiosulphate, and sodium sulphide plus sodium sulphite, each constituent being present in an amount corresponding to 5 cc. of the respective stock solution. Curve 5 represents the cases both of sodium sulphide alone and sodium sulphide plus sodium thiosulphate, identical results having been obtained in the two instances. Curves 2, 4, 6, 7, and 9 represent the titration of these respective solutions in the presence of formaldehyde. The effect of formaldehyde is quite striking, enhancing, as it were, the alkaline properties of all three constituents of the solutions investigated. Curve 8 shows the controverting effects realized in the ordinary acidimetric titration of a mixture of sulphide and sulphite since, in the absence of such interference, this curve should be a strictly additive combination of Curves 3 and 5. However, at a pH of 4 the result is about 12% less than the value calculated on the basis of such an assumption. Apparently there is some sort of interaction between sulphide and sulphite, even at high pH values, because the first break in the curve did not occur until the titration of the mixture was about 57% complete (on the basis of the calculated total for complete neutralization of the sulphide and conversion of sulphite to bisulphite), whereas otherwise it should have occurred between 33 and 34% neutralization. In the presence of formaldehyde (Curve 9) the titration to a pH of 4 corresponds to the calculated theoretical value, interference due to interaction of the constituents having been eliminated. Only a single, very deep and sharp break in the curve is obtained. Both constituents when titrated in the presence of formaldehyde produce curves (Curves 4 and 6, respectively), typical of the titration of a strong base, high pH values being maintained up to the immediate vicinity of the equivalence point. In the case of sodium sulphite, this point corresponds to

the complete conversion of sulphite to bisulphite; in the case of sodium sulphide, to complete neutralization to hydrogen sulphide, there being no intermediate inflection corresponding to the bisulphide end point. From Curve 2 it is seen that the presence of formaldehyde causes sodium thiosulphate to behave as a very weak base relative to its acidimetric titration. The inflection point corresponding to one equivalent per mole of thiosulphate does not occur until a pH of something less than 3 is reached and it is not at all sharp. At a pH of 4 the titration of the thiosulphate is only about 70% complete. The same behavior occurs in mixture with sodium sulphide as shown by Curve 7, which appears as a strictly additive combination of Curves 2 and 6. The partial titration of sodium thiosulphate in the presence of formaldehyde at a pH of 4 (corresponding to the methyl orange end point), with the consequent buffering action at that point adversely affecting the precision of end-point detection, restricts the advantageous use of formaldehyde to cases where no thiosulphate is present. For a generally applicable method which will suffer interferences from neither sulphite nor thiosulphate in the acidimetric titration of solutions containing sulphide, the use of furfural appears most suitable in comparison with the other aldehydes investigated.

The recommended method for the determination of total alkali, which in principle involves an acidimetric titration in the presence of furfural to the methyl orange end point or corresponding pH employing either potentiometric or color indicator methods of end point detection, offers an advantageous accuracy and expediency when applied to solutions of the general nature of sulphate white or green liquors. The method is inadequate when applied to black liquors due to the presence of colored organic compounds and sodium organic salts which are incompletely neutralized at a pH of 4 and which make precise end point detection impossible. It is desirable that the determination of the total alkali content of black liquor include all the sodium organic compounds and afford a reliable basis for the estimation of all sodium ultimately recoverable as active alkali. A conductometric method for the analysis of kraft liquors has been proposed by Whittemore, Aronovsky, and Lynch *(2)*, which involves the use of a specially designed and inexpensive conductometric apparatus depending for its operation on the measurement of the current flowing through the solution between electrodes maintained at a constant potential by rheostatic adjustment. As applied in this work to a sample of commercial black liquor the method did not seem to provide adequate precision for quantitative differentiation between the different components of the liquor but it did appear promising as a means of measuring the total alkali content. Prompted by the results obtained relative to the effect of aldehydes on the potentiometric titration of the inorganic constituents normally appearing in the liquor, a similar investigation was made relative to the conductometric method.

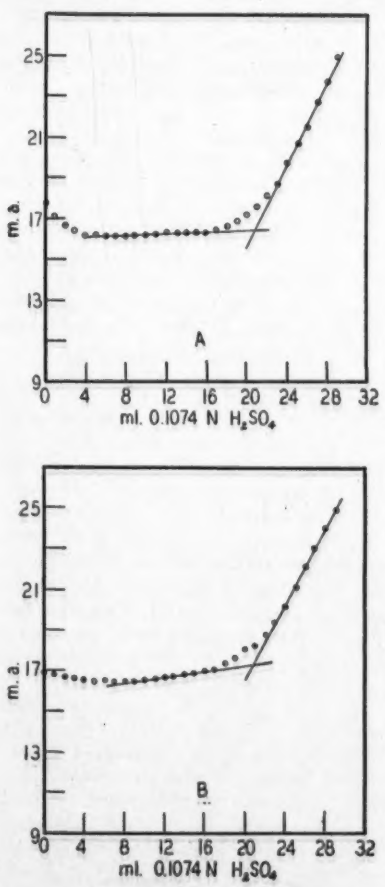

FIG. 4

A. Kraft Black Liquor without Aldehyde. B. Kraft Black Liquor with Formaldehyde

In Fig. 4 are shown graphs representing the conductometric titration with standard acid of a sample of a commercial kraft black liquor. Fig 4A represents the titration of a sample corresponding to 2 cc. of the original liquor unattended by any auxiliary material except the dilution water. Fig. 4B represents the titration of a like sample in the presence of formaldehyde. Although the form of the initial portion of the curve is changed by the presence of formaldehyde, the position of the final end point as defined by the intersection of the two straight lines is the same within experimental error (20.8 cc. as compared with 21.0 cc. in the presence of formaldehyde). When calculated to grams of Na_2O per liter of liquor the values obtained are, respectively, 34.6 and 35.0. Titrated potentiometrically to a pH of 4 in the presence of furfural, a value in the neighborhood of 30.0 grams Na_2O per liter was obtained. This result, together with the nature of the potentiometric curve obtained, indicates the incomplete neutralization of the sodium organic salts and illustrates the inadequacy of the potentiometric methods as a measurement of the total alkali of black liquors. When samples of the liquor were evaporated to dryness, incinerated to a point where the organic compounds were decomposed but the carbon incompletely volatilized, and the solutions obtained by leaching the residue subsequently titrated with acid to the methyl orange end point, a value of 36.1 grams Na_2O per liter was obtained. Since it is highly probable that a reduction to sodium sulphide of at least some of the sodium sulphate present in the liquor occurred during the incineration process, it appears from the results obtained that the conductometric titration method may afford quite an accurate and reliable measurement of the total alkali content of kraft black liquors.

In order to delineate possible controverting effects due to the simultaneous occurrence of sulphide, sulphite, and thiosulphate in the liquor and possible advantageous effects accompanying the use of aldehydes as encountered in previous experience with the potentiometric method, conductometric titrations were made on solutions of these constituents both in the presence and absence of aldehydes. Figure 5A contains the conductometric titration curves for sodium sulphide corresponding to one cc. of the stock solution. Curve 1 represents the titration in the absence of aldehyde and shows an initial break corresponding to the bisulphide end point and a final break corresponding to complete neutralization. The initial break occurs about 5% short of its theoretical position midway of the total titration. The final break occurs about 10% short of the calculated end point based on the known composition of the stock solution. This discrepancy is probably explained, partially at least, by air oxidation of the sulphide. Curve 2 represents the titration in the presence of formaldehyde. Like the potentiometric curve only one break, corresponding to complete neutralization, is obtained. Unlike the potentiometric titration, the shape of the curve is not typical of the titration of a srong base, the initial rapid drop in conductivity being absent. The final end point occurs slightly above the calculated value based on the known Na_2S content of the stock solution. This is probably due to the further titration of the small amount of sodium thiosulphate formed in the solution on standing. The result also indicates that the presence of formaldehyde protects the sulphide from air oxidation. Curve 3, representing the titration in the presence of furfural, is similar to that obtained in the absence of aldehyde except for an eccentric behavior in the vicinity of the final end point. If the projection of the upper portion of the acid line is used in determining the end point, a result higher than that obtained in either of the other two titrations is obtained. Such a result remains unexplained, as is the fact that titration of a sample of the previously mentioned black liquor in the presence of furfural resulted in a value for total alkali which was about 10% higher than that obtained with aldehyde absent or with formaldehyde. Figure 5B shows the results of corresponding titrations of sodium thiosulphate. Either in the absence of aldehyde or in the presence of furfural no break occurs in the curves, which rise smoothly from the initial points. With formaldehyde present a decided break in the curve, corresponding to one equivalent of acid per mole of thiosulphate, is obtained. The acid line, however, is again characterized by an evident curvature as in the other two titrations and it is to be expected that this will cause some uncertainty in end point detection by conductometric titration methods in the case of liquors containing considerable amounts of thiosulphate. In Fig. 5C are shown curves representing the titration of sodium sulphite. The presence of aldehyde has no fundamental effect on the result obtained, each graph showing a single sharp break corresponding to the bisulphite equivalence point. Furfural influences the shape of the initial portion of the curve more than formaldehyde. The titration in the absence of aldehyde gives a result considerably lower than otherwise obtained and about 25% lower than the calculated value based on the known composition of the stock solution. It is believed that this result is again to be attributed to the occurrence of air oxidation and the protective influence of the aldehydes. The curves in Fig. 5D represent the titration of a mixture of sodium sulphide and sodium sulphite in amounts corresponding to 0.5 cc. of each of the stock solutions involved. The final end point, corresponding to complete neutralization of the sulphide and conversion of the sulphite to bisulphite, is much the same either in the absence or presence of formaldehyde and is less than 5% short of the theoretical end point calculated from the known composition of the stock solutions. The result shows that, as regards the conductometric titration of such a mixture, the interaction of sulphide and sulphite is of no consequence and suggests that the two constituents may be mutually protective as regards air oxidation. In view of this there appears to be no advantage in the use of aldehydes in the titration mixtures of such materials as here considered when end point detection is to be made conductometrically and is, in fact, to be avoided, because certain indications as to the composition of the solution derivable from the form of the first portion of the titration curve would thereby be lost or confused. In the case of black liquors, the organic materials present possibly provide the protection against air oxidation of the inorganic constituents which otherwise might be achieved by the use of aldehydes.

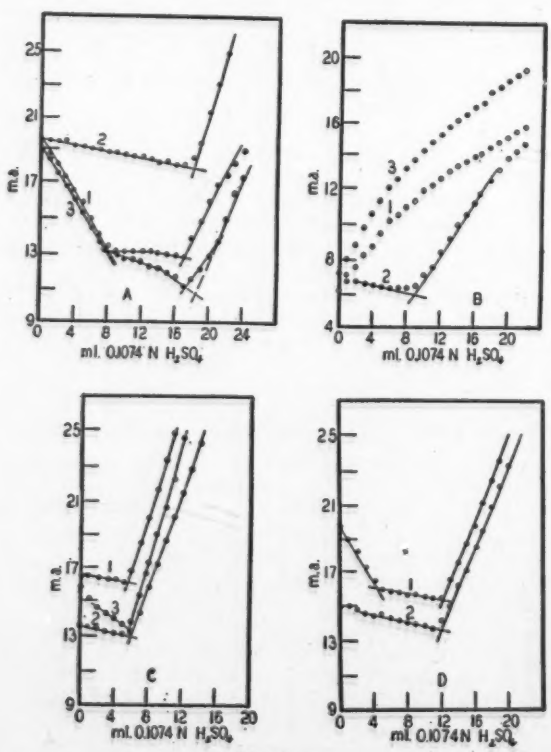

FIG. 5

A. Sodium Sulphide. B. Sodium Thiosulphate. C. Sodium Sulphite. D. Sodium Sulphide plus Sodium Sulphite. In Each Set of Curves: 1. No Aldehyde. 2. With Formaldehyde. 3. With Furfural

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2. Whittemore, E. R., Aronovsky, S. I., and Lynch, D. F. J., *Paper Trade J.* 108, no. 17:33-40 (April 27, 1939); *Tech. Assoc. Papers* 22:609-616 (June, 1939).

IMPORTS OF PAPER

NEW YORK IMPORTS

WEEK ENDING JULY 18, 1942

SUMMARY

Newsprint ..... 1462 rolls
Filter Paper ..... 13 cs.

NEWSPRINT

——, ——, ——, 382 rolls.
——, ——, ——, 409 rolls.
——, ——, ——, 342 rolls.
——, ——, ——, 329 rolls.

FILTER PAPER

J. E. Bernard & Co., ——, ——, 13 cs.

CASEIN

J. H. Schroeder Bkg. Corp., ——, ——, 417 bags.
Keer Maurer Co., ——, ——, 667 bags.
J. H. Schroeder Bkg. Corp., ——, ——, 167 bags.
American British Chemical Supplies, ——, ——, 417 bags, (ground lactic).
Chemical Bank Trust Co., ——, ——, 83 bags, (ground lactic).
Tupman Thurlow Co., Inc., ——, ——, 834 bags, (ground).

Indianapolis Demand Slower

[FROM OUR REGULAR CORRESPONDENT]

INDIANAPOLIS, Ind., July 27, 1942—Paper demand in this territory generally is off. This applies virtually to all grades. Local manufacturers and jobbers says that outside strictly government requirements there is little demand and ceiling restrictions mean virtually nothing now. The fine paper market in particular has been hard hit. Covers, books and ledgers are lethargic both in movement and price.

Kraft demand, which has been fairly good in recent weeks, apparently has joined the general downward movement. This is a distinct surprise to jobbers.

Building paper demand, due to government restrictions, has slumped far below the volume of last year. Although this is a highly defense area, building permits have fallen below those of last year by half in volume. Residence construction of the cheaper type has been fairly good, but the volume in high grade residences, apartment houses and business buildings has been virtually nil, due largerly to government restrictions. This applies also, of course, to roofing papers.

Bag and wrapping paper demand has decreased. A concerted movement, started early this year, to conserve bags and wrapping paper, has reacted out of all expectations, leaving dealers in these lines rather out on a limb. The demand from the large department stores and other businesses is about 60 per cent of what it was a year ago in spite of the fact that these dealers are doing more business.

The summer specialties the last week were moving a trifle more actively, but the volume is below last year. Curtainment of tires and automobiles is serving to keep vacationists at home and summer goods naturally has declined. Tissues continued, however, to move in fair shape.

Waste paper here last week was quiet. Local warehouses are loaded and the move to gather waste paper apparently continues unabated. Mills were very conservative in their buying. Not much change in prices was noted. The rag market also continued quiet, though there was some demand for roofing grades and the lower qualities.

B. C. Pulp Mills Handicapped

[FROM OUR REGULAR CORRESPONDENT]

VANCOUVER, B. C., July 27, 1942—Various conditions for which the war is responsible have interferred with smooth operation of B.C. Pulp and Paper Company, Ltd., at its Port Alice and Woodfibre, B.C. plants. Despite these handicaps the company is only slightly behind schedule in its promised deliveries, advises Lawrence Killam, president. An $800,000 expansion program was started last summer with the approval and active support of the government because of the essential character of the industry. This has been delayed in completion due to slow delivery of some of the necessary material.

Changes were affected at Woodfibre in May which are expected to step up production about 30 tons daily. This plant depends on purchase of hemlock on the open market and the current shortage of hemlock may affect operations in the future. Woodfibre has had sufficient hemlock for its requirements so far, Mr. Killam advises, and there has been no slackening in operations except for two weeks in May when the changes were being effected.

At Port Alice the expansion program launched a year ago is expected to be completed this fall. This will give the company total production of something over 400 tons daily. The Port Alice plant is fed with hemlock from the company's own timber limits. No shortage of raw material is anticipated so long as the supply of suitable labor can be maintained.

Withdrawal of several hundred trained Japanese woodsmen from the coast early this year confronted the company with a major problem. With the aid of government agencies efforts are meeting with some success in securing men who can stand up to the strenuous work in the woods. If this problem is satisfactorily adjusted a big obstacle will be hurdled in maintaining this important industry.

The Story of Sulphur

There are thousands of interesting stories to be found in the struggles of men to provide raw materials, chemicals and other products for industrial and countless other important uses. Only a very few of these accounts have been published. The book, "The Stone That Burns," by Williams Haynes, published on August 6 by the D. Van Nostrand Co., 250 Fourth avenue, New York, at $3.75 a copy, is one of them. It tells the story of American courage and perseverance through many years, in making available a basic chemical raw material—sulphur, essential alike in peace and in war.

This story of the American sulphur industry, presents a comprehensive explanation of the discovery and development of surphur in the United States. It also provides a great deal of statistical information on the subject.

Gets Vacation After 65 Years

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., July 27, 1942—John Vivian, of Cook-Vivian Company, fine paper merchants, who on July 1 rounded out 65 years with the company without the loss of a day, is to go to Jasper National Park for from four to six weeks, accompanied by Mrs. Vivian and other friends.

New York Paper and Pulp Market Review

Paper and Pulp Markets Seasonally Quiet With Supply Situation Definitely Easier—OPA Issues Order Reducing Kraft Paper Prices — Collections of Waste Paper Decline — Rags Are Less Active.

Office of the PAPER TRADE JOURNAL,
Wednesday, July 29, 1942.

Purchasing for consumption in the wholesale paper market continues to be relatively light. Current reports received from many manufacturers' representatives, jobbers, and general paper merchants, reflect the rather severe decline and indicate that the downward trend is quite widely expected to continue through next month.

Although the war effort which the United States is making must inevitably create great hardship and occasion financial loss to thousands of concerns, the attempt to strike as good a balance between the production and distribution of civilian and military goods should be given more consideration. Belatedly, this concept of the national situation is now being discussed by governmental agencies. It now seems that there are too many plants engaged in war work in relation to the supplies of available materials. It is proposed that the production of goods for civilian consumption be concentrated in designated plants. Unfortunately, too little attention has been devoted to the continued operation of small plants. The prospect of the survival of a great many of these private enterprises so characteristic a part of a democracy, becomes more critical as the war effort progresses.

The index of general business activity rose to 130.4% for the week ended July 18, from 127.0% for the preceding week, compared with 131.0% for the corresponding week last year. Paper board production was 10.4% higher.

Paper production for the week ended July 18 was estimated at 81.7%, compared with 100.7% for 1941, with 91.3% for 1940, with 81.1% for 1939, and with 76.3% for the corresponding week for 1938.

Paper board production for the week ended July 18 was 92.0%, compared with 92.0% for 1941, with 77.0% for 1940, with 70.0% for 1939, and with 65.0% for the corresponding week for 1938.

The OPA issued July 23, Price Regulation No. 182. This reduces manufacturers' prices on kraft papers about 25 cents per cwt. This order supercedes the General Maximum Price Regulation and becomes effective July 28, 1942. Merchants' markups are also covered in the order. The order states: "A stop-gap price of $4.75 per cwt. for standard kraft wrapping paper was fixed by Maximum Price Regulation No. 129, and was based on the individual agreements signed by most manufacturers in December 1941 at the request of the OPA. This price, although reflecting an unwarranted advance, halted further price increases until OPA could complete its analysis of the costs and profits data submitted by the industry, which culminated in today's action reducing the maximum prices to $4.50 per cwt. for standard kraft wrapping paper, the key commodity of the group."

Wood Pulp

Mill buying of roofing rags is currently slow and mill production is reported at a relatively low ratio of around 50%. Prices are unchanged.

No important change has been reported in cotton cuttings this week. Mill buying is limited.

Old Rope and Bagging

Demand continues good for old No. 1 Manila rope. The OPA ceiling price is well maintained.

Prices on scrap bagging are easier at this date. Expectations that the OPA may issue a maximum price schedule is reported as exerting influence for lower prices on No. 1 gunny and on the roofing grades.

Old Waste Paper

No important change in prices has been reported this week in old waste paper. Reports indicate that collections have sharply declined. Supplies, however, averaging around two months stocks at mills, are still viewed as ample and the market situation continues soft under limited mill buying.

Twine

Little change has occurred in the twine market during the current week. An easier situation is reported, with all imported fibers relatively scarce. Prices on standard brands of hard and soft fiber twines are reported unchanged.

Paper and Cordage Men Play Golf

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., July 27, 1942—The summer golf outings of the Philadelphia Paper and Cordage Association are now under way, and aside from the recreational advantages, these outings afford exceptional opportunities for the men who serve the paper and cordage wants of consumers to meet on the greensward and oftimes iron out little quirks that are not possible of solution otherwise. On Tuesday last, Frank O'Neill of Paper Manufacturers, was host at the Huntingdon Valley Club, Abington, Pa.

Dick Gifford, of the H. M. Gifford Manufacturing Company, and secretary of the association, announces that it is necessary to postpone the August 18 tournament at Old York Road Country Club, to the following Tuesday, August 25, and adds that having this advance notice, all those contemplating participation in this tournament will have ample time to make their plans.

W. Buchanan To Be Superintendent

The North American Pulp and Paper Corporation has appointed Walter Buchanan superintendent of its mill at Cheboygan, Mich. He was formerly associated with the Fort Edward mill of the International Paper Company and the Mead Pulp and Paper Corporation. Mr. Buchanan specializes in the manufacture of bond, book and tissue paper.

James F. Fielding, former superintendent of the Chillicothe Paper Company will assist Mr. Buchanan. Mr. Fielding's specialization is on offset and blueprint papers.

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, July 29, 1942.

BLANC FIXE—Quotations on blanc fixe are firm and continue unchanged at prevailing market levels. The pulp is currently quoted at $40 per ton in barrels, at works; the powder is offered at $60 per ton, f.o.b., works. Demand reported fair for the week.

BLEACHING POWDER—Prices on bleaching powder are firm. Supply under allocation control. Bleaching powder is currently quoted at $2.25 per 100 pounds, in drums, at works.

CASEIN—Quotations on casein are lower for the week. Standard domestic casein, 20-30 mesh, is currently quoted at 14½ cents per pound; 80-100 mash at 15 cents per pound; all prices in bags, car lots. Standard Argentine casein is currently offered at 10½ cents per pound, c.i.f. No quotations on French casein.

CAUSTIC SODA—Prices of caustic soda are reported unchanged. Supplies ample. Demand moderate for the current week. Solid caustic soda is currently quoted at $2.30 per 100 pounds, flake and ground at $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—Quotations on china clay are firm and continue unchanged. Demand reported fair for the current week. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay is quoted at from $12 to $22 per ton, at mines. Imported clay is quoted at from $13 to $25 per long ton, ship side.

CHLORINE—Quotations on chlorine unchanged. Government demand for war use continues very heavy. Chlorine is currently quoted at from $1.75 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—Quotations on some grades of rosin are lower for the current week. "G" gum rosin is currently quoted at $2.97 per 100 pounds, in barrels, Savannah. "FF" wood rosin is currently quoted at $2.95 per 100 pounds in barrels, New York. Seventy per cent gum rosin size is quoted at $3.32 per 100 pounds, f.o.b., works.

SALT CAKE—Prices on salt cake are firm. Demand reported moderate for the current week. Domestic salt cake is currently quoted at $15 per ton in bulk; chrome salt cake at $16 per ton. All prices in car lots, f.o.b., shipping point. Quotations on imported salt cake are nominal at $16 per ton.

SODA ASH—Quotations on soda ash are less firm and continue to conform to prevailing market quotations. Demand moderate. Quotations on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Prices on corn starch continue unchanged for the current week. Pearl is currently quoted at $3.10 per 100 pounds; powdered starch at $3.20 per 100 pounds; all prices in bags, car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm. Demand reported moderate. The commercial grades are currently quoted at $1.15 per 100 pounds; iron free at from $1.75 to $1.85 per 100 pounds, in bags, car lots, f.o.b., works.

SULPHUR—Prices of sulphur are firm and continue to conform to prevailing market quotations. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are quoted at $18 per ton.

TALC—Quotations on talc are firm and continue unchanged at prevailing market prices. Domestic talc is currently quoted at from $15 to $21 per ton, at mills. No quotations on imported talc.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00	"	—
Kraft—per cwt.—Carload Quantities Zone A, f.o.b. Mill			
Superstandard Wrapping	$5.00	@	—
No. 1 Wrapping	4.75	"	—
Standard Wrapping	4.50	"	—
Standard Bag	4.125	"	—
Tissues—Per Ream—Carlots			
White No. 1	1.12½	"	—
White No. 1 M. G.	1.05	"	—
White No. 1½	1.00	"	—
White No. 2	1.00	"	—
Anti-Tarnish M. G.	.95	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—
Paper Towels, Per Case—			
Unbleached, Jr.	2.35	"	—
Bleached, Jr.	2.65	"	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	11.25	@	—
No. 1 Manila Wrapping, 35 lb.	5.50	"	5.75
No. 2 Manila Wrapping, 35 lb.	5.25	"	5.50
Boards, per ton—			
News	*48.00	@	—
Chip	*45.00	"	—
Sgl. Mla. Lt. Chip	*60.00	"	—
White Pat. Coated	*75.00	"	—
Kraft Liners 50 lb.	*60.00	"	—
Binders Boards	84.00	"	116.00

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers
100% Rag Ext. No. 1	$40.25 @ $47.25		$41.40 @ $48.50
100% Rag	32.20 " 37.75		33.35 " 39.25
85% Rag	.... "		32.20 " 37.75
75% Rag	24.75 " 29.00		25.90 " 30.50
65% Rag	.... "		22.80 " 27.75
50% Rag	18.70 " 22.75		19.90 " 24.25
25% Rag	16.40 " 20.00		17.55 " 21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items. Delivered in Zone 1:

	Bonds		Ledgers
No. 1	$10.55 @ $12.75		$11.70 @ $14.25
No. 2	9.65 " 11.75		10.80 " 13.25
No. 3	9.20 " 11.25		10.35 " 12.50
No. 4	8.90 " 10.75		10.05 " 12.25

Colors $1.00 cwt. extra.

Tree Sheet Book Papers—White, Cased Paper. Delivered in Zone 1:

No. 1 Glossy Coated	$13.65	@	$15.50
No. 2 Glossy Coated	12.40	"	14.00
No. 3 Glossy Coated	11.60	"	13.25
No. 4 Glossy Coated	11.15	"	12.75
No. 1 Antique (watermarked)	10.25	"	11.75
No. 2 Offset	9.60	"	11.00
A Grade E. F.	9.35	"	10.75
A Grade S. & S. C.	9.60	"	11.00
B Grade E. F.	8.85	"	10.25
B Grade S. & S. C.	9.10	"	10.50
C Grade E. F.	8.35	"	9.75
C Grade S. & S. C.	8.80	"	10.00
D Grade E. F.	8.25	"	9.50
D Grade S. & S. C.	8.50	"	9.75

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers Prices, Less Freight to Destination.

Bl. Softwood Sulphite	$76.00		
Unbl. Softwood Sulphite	64.00	@	66.00
Bl. Hardwood Sulphite	73.50		
Unbl. Hardwood Sulphite	63.50		
Bl. Mitscherlich	81.00		
Unbl. Mitscherlich	72.00		
N. Bleached Sulphate	86.00		
S. Bleached Sulphate	79.00		
N. Semi-Bleached Sulphate	82.00		
S. Semi-Bleached Sulphate	75.00		
N. Unbl. Sulphate	73.00		
S. Unbl. Sulphate	63.50		
Bl. Soda	66.00		
Unbl. Soda	62.00		
Groundwood	46.00		

Transportation Allowances Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$13.50
Lake Central	13.50
Southern	16.00
West Coast (in area)	10.50
West Coast (out area)	16.50

	50%-80% Air Dry Weight
Northeast	$11.50
Lake Central	11.50
Southern	14.00
West Coast (in area)	9.50
West Coast (out area)	15.50

Applying to Producers of Dry Wood Pulp.

	Above 80% Air Dry Weight
Northeast	$8.50
Lake Central	8.50
Southern	11.00
West Coast (in area)	7.50
West Coast (out area)	13.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum price.

Domestic Rags

New Rags (Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	3.00	@	3.25
Silesias No. 1	4.50	"	4.75
New Unbleached	8.00	"	8.25
Blue Overall	5.75	"	6.00
Fancy	3.00	"	3.25
Washables	2.50	"	2.75
Mixed Khaki Cuttings	2.50	"	2.75
O. D. Khaki Cuttings	3.00	"	3.15

Old Rags

White, No. 1—			
Repacked	*3.80	"	—
Miscellaneous	*3.20	"	—
White, No. 2—			
Repacked	*2.90	"	—
Miscellaneous	*2.65	"	—
Third and Blues—			
Repacked	*2.20	"	—
Miscellaneous	*1.80	"	—
Roofing Rags—			
No. 1	*1.55	"	—
No. 2	*1.45	"	—
No. 3 (bagging)	*1.35	"	—
No. 4	*1.35	"	—
No. 5A	*1.35	"	—
* Old Manila Rope	5.75	"	—

*OPA Maximum Prices.

Foreign Rags

All prices nominal

New Rags			
New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxfords	4.00	"	4.50
New Light Prints	3.00	"	3.25
Old Rags			
No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—
No. 4 White Linens	2.25	"	3.25
No. 1 White Cotton	4.25	"	4.75
No. 2 White Cotton	3.25	"	3.75
No. 3 White Cotton	2.50	"	3.00
No. 4 White Cotton	1.90	"	2.20
Extra Light Prints	2.00	"	2.40
Ord. Light Prints	1.75	"	2.15
Med. Light Prints	1.55	"	1.95
Dutch Blue Cottons	2.25	"	2.50
French Blue Linens	3.00	"	—
Checks and Blues	2.00	"	—
Linsey Garments	1.90	"	2.00
Dark Cottons	1.50	"	1.60
Old Shopperies	1.30	"	1.45
New Shopperies	1.45	"	1.50
French Blues	2.25	"	2.50

BAGGING

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	4.00	@	4.25
Wool Tares, light	4.25	"	4.50
Wool Tares heavy	4.50	"	4.75
Bright Bagging	4.50	"	4.85
Manila Rope—			
Foreign	—	"	—
Domestic	*5.75	"	—
Jute Threads	4.25	"	4.75
Sisal Strings	3.25	"	3.75
Mixed Strings	1.10	"	1.20

* OPA Maximum Price.

Old Waste Papers

(F. o. b. New York)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Envelope Cuts	3.12½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, one cut	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.42½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Mixed Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
Mixed Groundwood Colored Shavings	.90	"	—
Overissue Magazines	1.67½	"	—
No. 1 Heavy Books & Magazines	1.57	"	—
Mixed Books	1.07½	"	—
No. 1 White Ledger	2.17½	"	—
No. 2 Mixed Ledger, colored	1.87½	"	—
New Manila Envelope Cuttings, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
Extra Manilas	1.85	"	—
Mixed Kraft, Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
Triple Sorted, No. 1 Brown Soft Kraft	2.50	"	—
New 100% Kraft Corrugated Cuttings	2.25	"	—
No. 1 Assorted Old Kraft	1.75	"	—
New Jute Corrugated Cuttings	1.75	"	—
Old Corrugated Containers	1.00	"	—
Box Board Cuttings	.72½	"	—
White Blank News	1.65	"	—
Overissue News	.85	"	—
No. 1 News	.75	"	—
No. 2 Mixed Paper	.70	"	—

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.21	@	—
White Hemp	.21	"	—
Fine Polished—			
Fine India	.26	"	—
Unpolished—			
Box	.17¾	"	—
Paper Makers	.17	"	—
Tube Rope	.19	"	—
Wall Paper	.20½	"	—
Wrapping	.23	"	—
Soft Fiber Rope	.19	"	—
Cotton	.25	"	—
(Hard Fiber)			
Medium Java	.18	"	—
Mex. Sisal	.16	"	—
Manila	—	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White No. 1	.07¼	@	.07½
New White No. 2	.04½	"	.05
Light Silesias	.04½	"	.04¾
Silesias, No. 1	.04	"	.04¼
Black Silesias, soft	.03¾	"	.04
New Unbleached	.07¼	"	.07½
Washable Prints	.03¾	"	.03½
Washable No. 1	.02	"	.02¼
Blue Overall	.04½	"	.05½
Cottons—According to grades—			
Washable shredding	—	"	.01¾
Fancy Percales	.03¼	"	.03½
New Black Soft	.02¾	"	.03
New Dark Seconds	1.75	"	2.00
Khaki Cuttings—			
No. 1 O. D.	.03	"	.03¼
No. 2 Mixed	.02¼	"	.02½
Corduroy	.01¾	"	.02¼
New Canvas	.04¾	"	.05¼
New Black Mixed	—	"	.02½

Domestic Rags (Old)

White No. 1—Repacked	3.80	"	—
White No. 2—Repacked	2.90	"	—
Miscellaneous No. 1	3.20	"	—
Miscellaneous No. 2	2.65	"	—
Thirds and Blues—			
Miscellaneous	1.80	"	—
Repacked	2.20	"	—
Black Stockings—			
(Export)	Nominal		
Roofing Stock—			
Foreign No. 1	Nominal		
Domestic No. 1	1.55	"	—
Domestic No. 2	1.45	"	—
Roofing Bagging	1.35	"	—
Old Manila Rope	5.75	"	—

Bagging

(F. o. b. Phila.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.00	"	3.50
Sisal Rope	3.75	"	—
Mixed Rope	.75	"	1.00
Scrap—			
No. 1	3.25	"	3.50
No. 2	1.75	"	1.80
Wool Tares, heavy	4.00	"	4.25
No. 1 New Light Burlap	3.90	"	4.00
New Burlap Cuttings	3.75	"	4.00

Old Papers

(F. o. b. Phila.)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.50	"	—
Soft White Shavings, one cut	2.87½	"	—
White Blank News	1.65	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 White Ledger	2.17½	"	—
No. 2 Ledger, colored	1.87½	"	—
No. 1 Heavy Books & Magazines	1.57	"	—
Overissue Magazines	1.67½	"	—
New Manila Envelope Cuttings	2.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.70	"	—
Box Board Cuttings	.72½	"	—
Jute Corrugated Cuttings	.90	"	—
Overissue News	.85	"	—
No. 1 News	1.00	"	—

BOSTON

Old Papers

(F. o. b. Boston)

OPA Maximum Prices

No. 1 Hard White Shavings, unruled	2.87½	@	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.42½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	2.50	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines	1.57	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.70	"	—
Overissue News	.85	"	—
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old Corrugated Containers	1.00	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	4.50	@	5.00
Sisal Rope	4.50	"	5.00
Mixed Rope	1.25	"	1.40
Transmission Rope—			
Foreign	(nominal)		
Domestic	4.00	"	4.25
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75	"	—
Soft Jute Rope	5.25	"	5.50
Jute Carpet Threads	3.25	"	3.50
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	4.50	"	—
Scrap Sisal	4.75	"	5.00
Scrap Sisal for Shredding	5.50	"	5.75
Wool Tares—			
Foreign	(nominal)		
Domestic	5.00	"	5.75
Aust. Wool Pouches	5.00	"	5.10
New Burlap Cuttings	5.25	"	5.50
Heavy Baling Bagging	4.75	"	5.00

CHICAGO

Waste Paper

(F. o. b. Chicago)

OPA Maximum Prices.

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.50	"	—
No. 1 Soft White Shavings	2.50	"	—
No. 1 White Ledger	2.17½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
Paper Mill Bagging	3.00	"	3.25
No. 2 Bagging	1.35	"	—

* OPA Maximum Price.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.04½	@	.04¾
Fancy Percales	.04¾	"	.05
New White No. 1	.07	"	.07½
New Light Flannelettes	.06	"	.06¼
Canton Flannel, Bleached	.08¼	"	.08½
Underwear Cutters, Bleached	.06½	"	.06¾
Underwear Cutters, Unbleached	6.50	"	6.75
Silesias No. 1	.06	"	.06¼
New Black Silesias	.03¼	"	.04
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached	.07½	"	.07¾
Blue Cheviots	.06	"	—
Fancy	.02¾	"	—
Washable	.02¾	"	—
Khaki Cuttings	.04¼	"	.04¾
O. D. Khaki	.04½	"	.04¾
Corduroy	.03½	"	.03¾
New Canvas	.07	"	.07½
B. V. D. Cuttings	.07¾	"	.08

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	@	—
Miscellaneous	3.20	"	—
White No. 2—			
Miscellaneous	2.65	"	—
Twos and Blues, Repacked	2.20	"	—
Old Blue Overalls	2.25	"	2.30
Thirds and Blues, Repacked	2.20	"	—
Miscellaneous	1.80	"	—
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	1.55	"	—
No. 2	1.45	"	—
No. 3	1.35	"	—
No. 4	1.35	"	—
No. 5, Quality A	1.35	"	—
Quality B	1.20	"	—
Quality C	.95	"	—
* Old Manila Rope	5.75	"	—

*OPA Maximum Prices.

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)